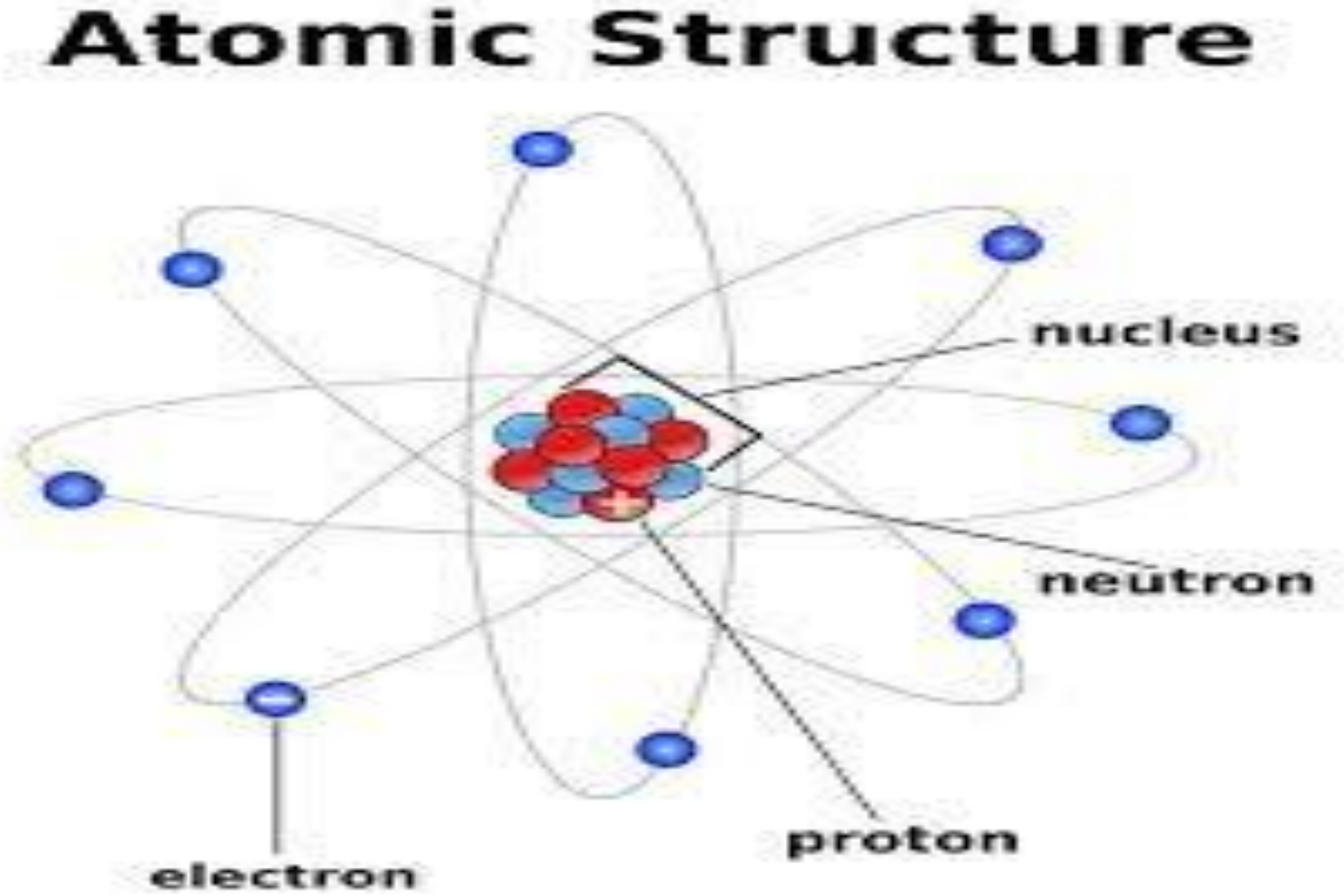
Pakistan School
Kingdom of Bahrain

LECTURE NO:1



MESSAGE OF THE DAY:

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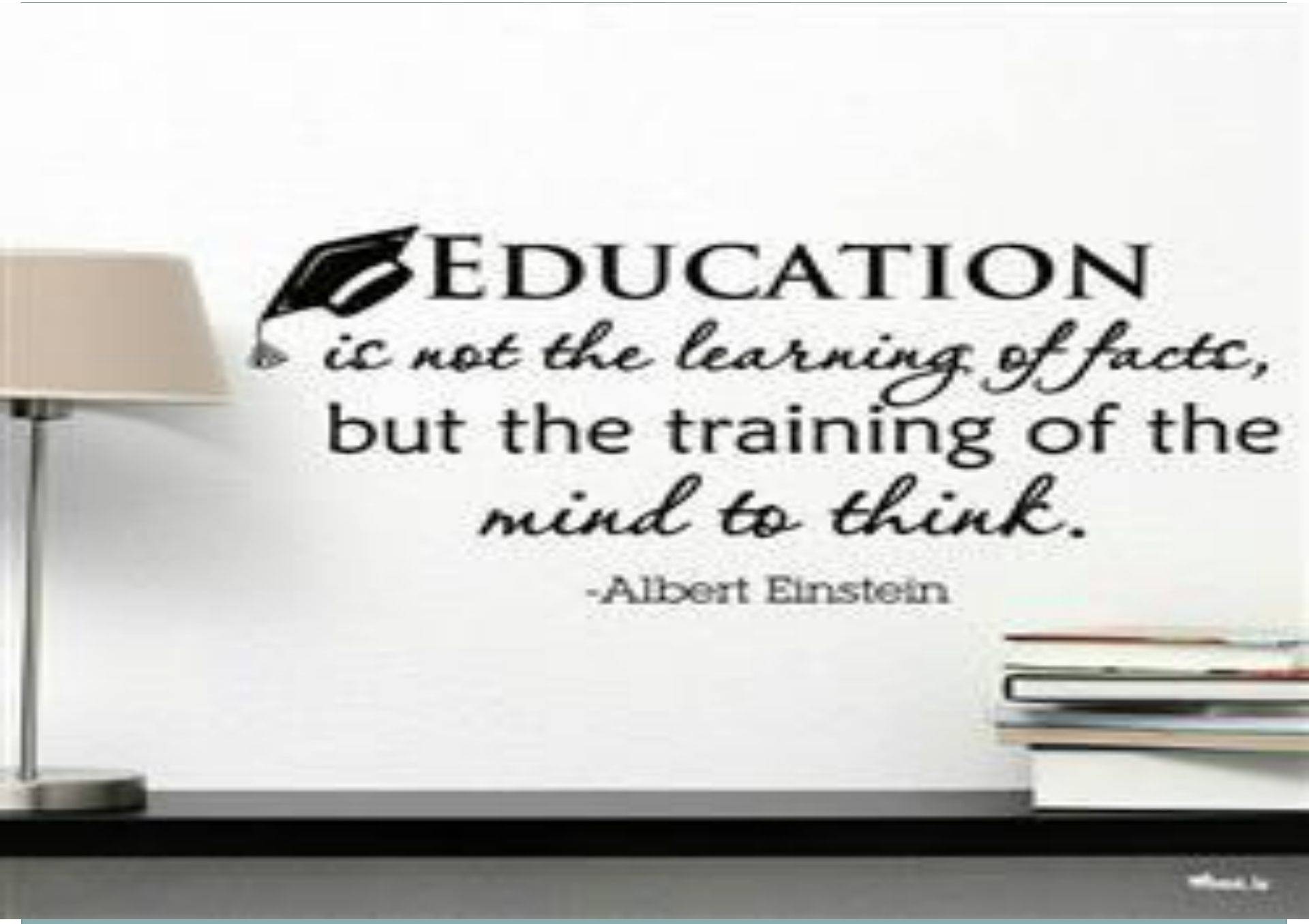
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-Albert Einstein


WELCOME
BACK


>> Ready for Anything
WELCOME BACK TO VIRTUAL CLASSES!
#WEAREALWAYSTOGETHER
AMERICAN


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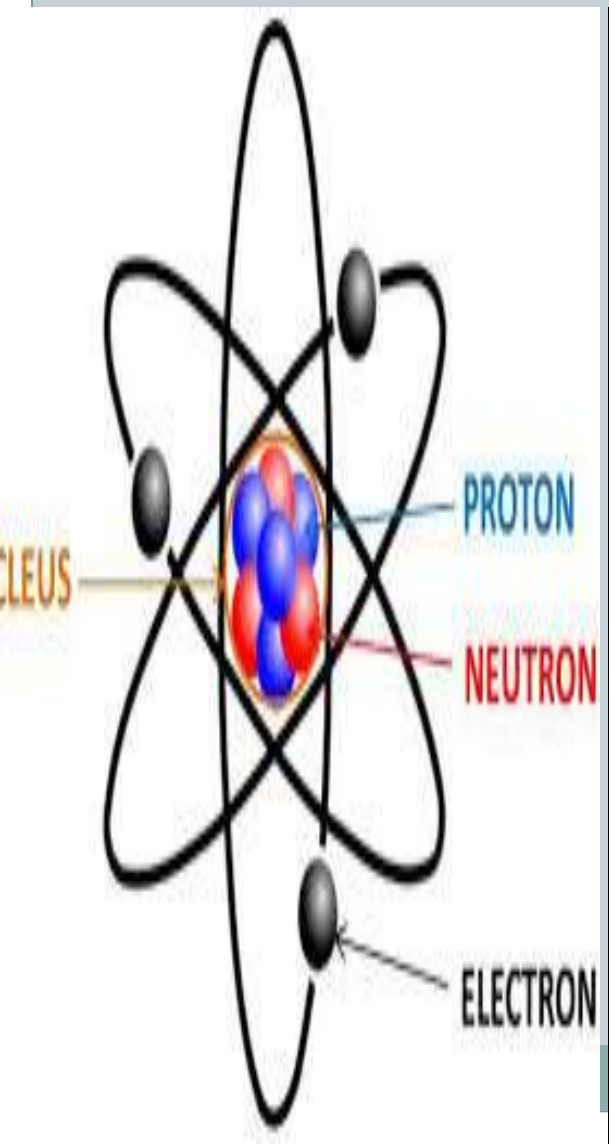
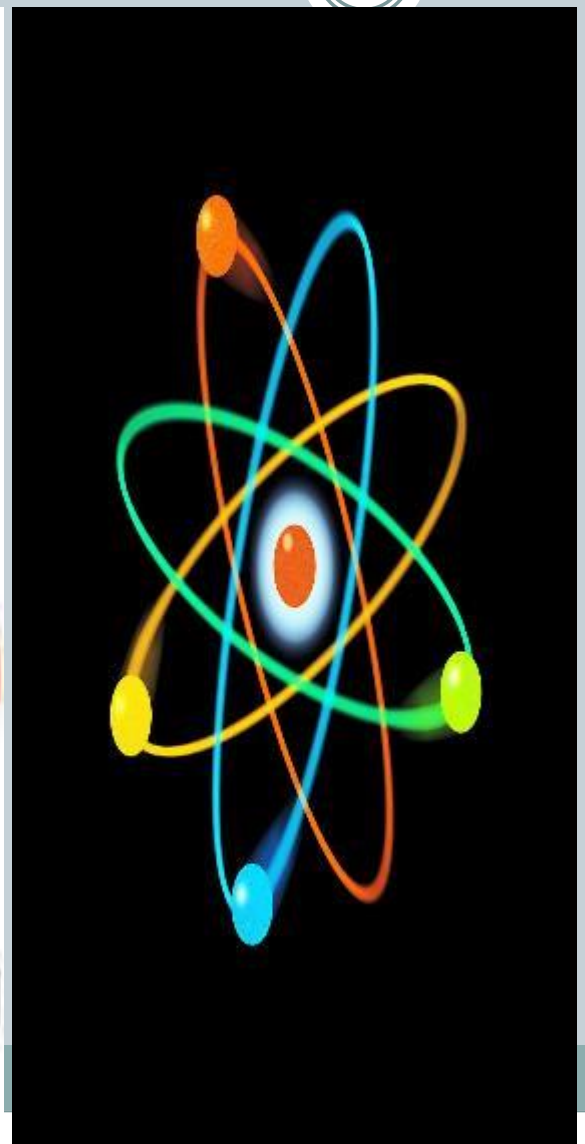
POINTS TO PONDER:

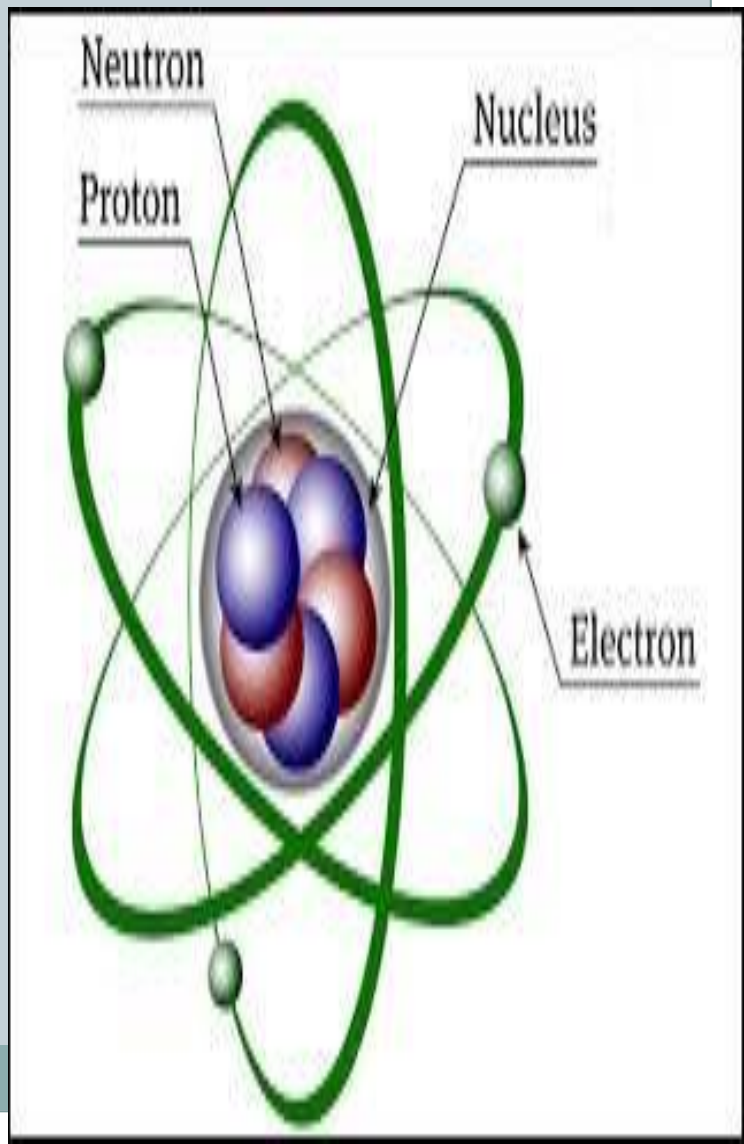
LESSON OBJECTIVES:1

- BY THE END OF THIS PART OF LESSON,STUDENTS WILL BE ABLE TO:
- Understand the structure of an atom.
- How electron(cathode rays) was discovered?
- Who discovered electron?
- Understand Dischargetube experiment
- Construction and working of discharge tube

POINTS TO PONDER:







POINTS TO PONDER:

Components of an Atom

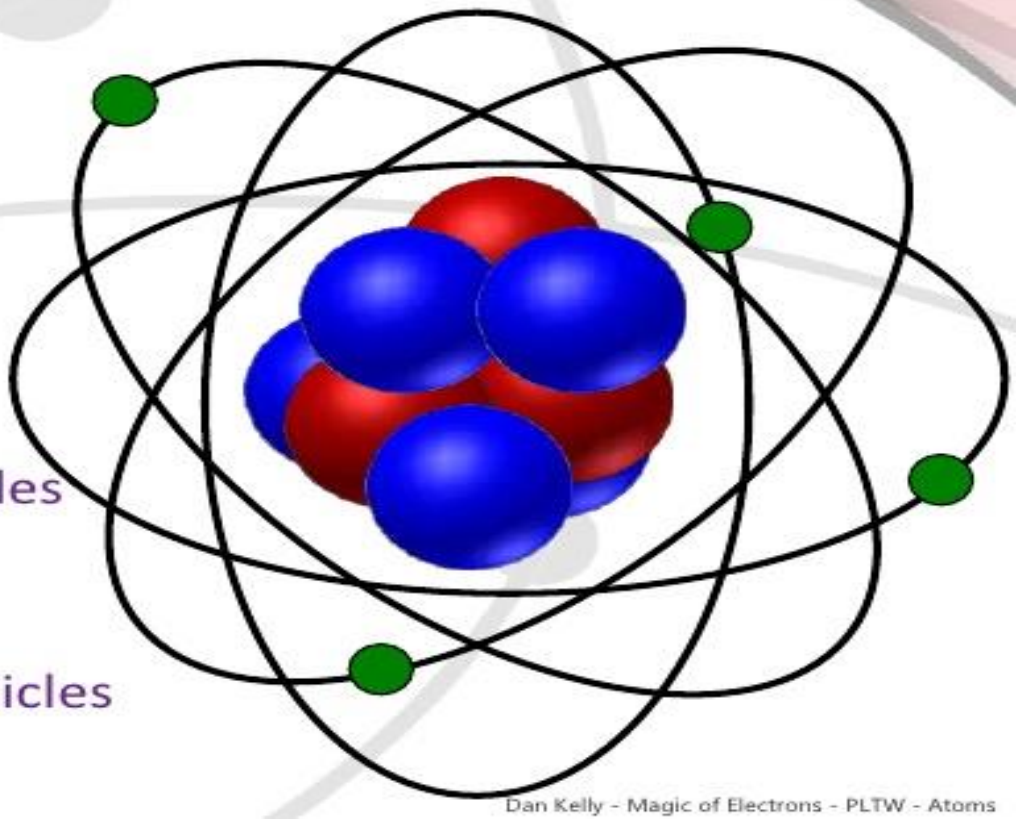
What makes up an **atom**?

At the center of all **atoms** is the **Nucleus**.

The **nucleus** contains **protons** and **neutrons.**

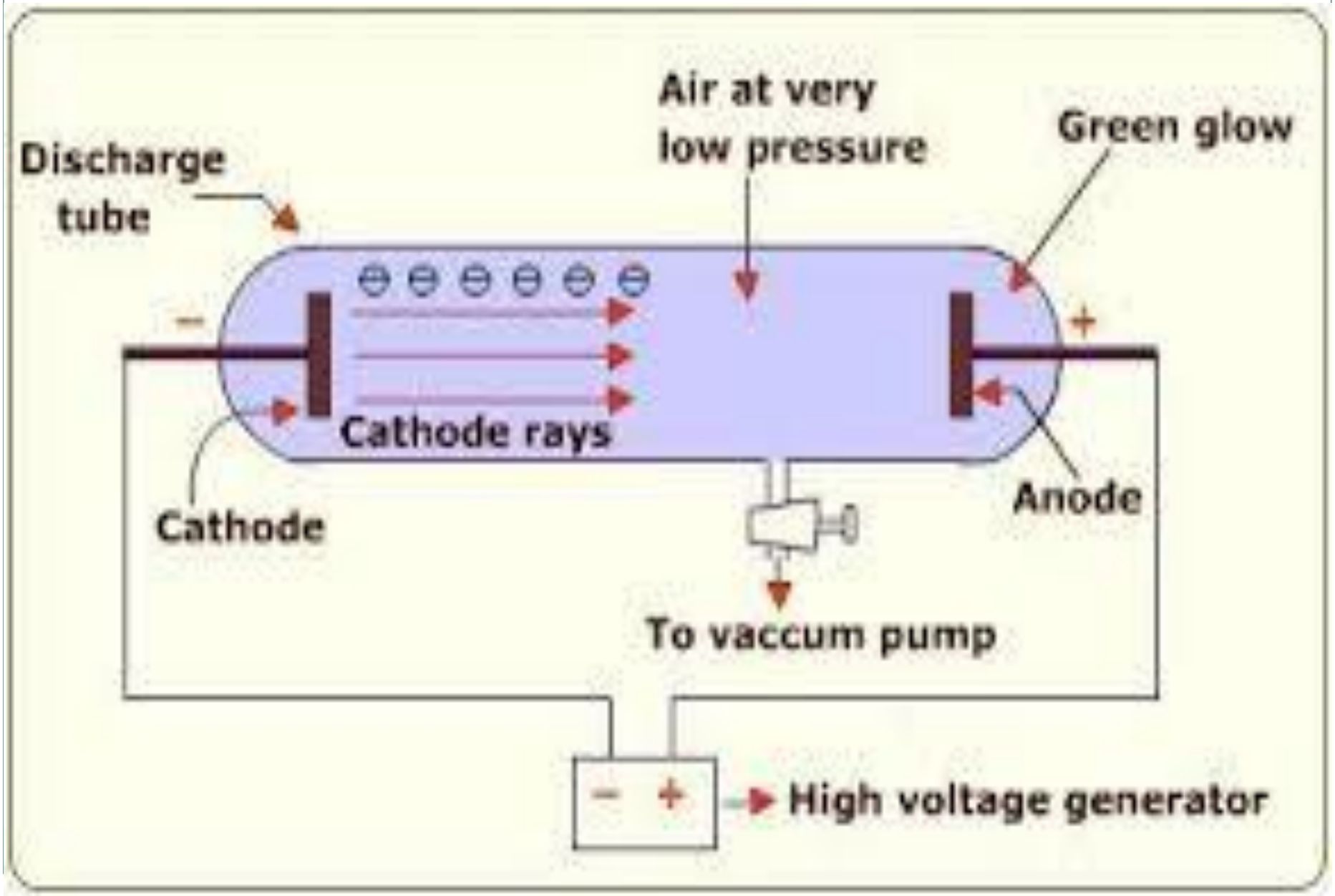
Protons: (+)
Positively charged atomic particles

Neutrons:
Uncharged (neutral) atomic particles



POINTS TO PONDER:

DISCHARGE-TUBE:



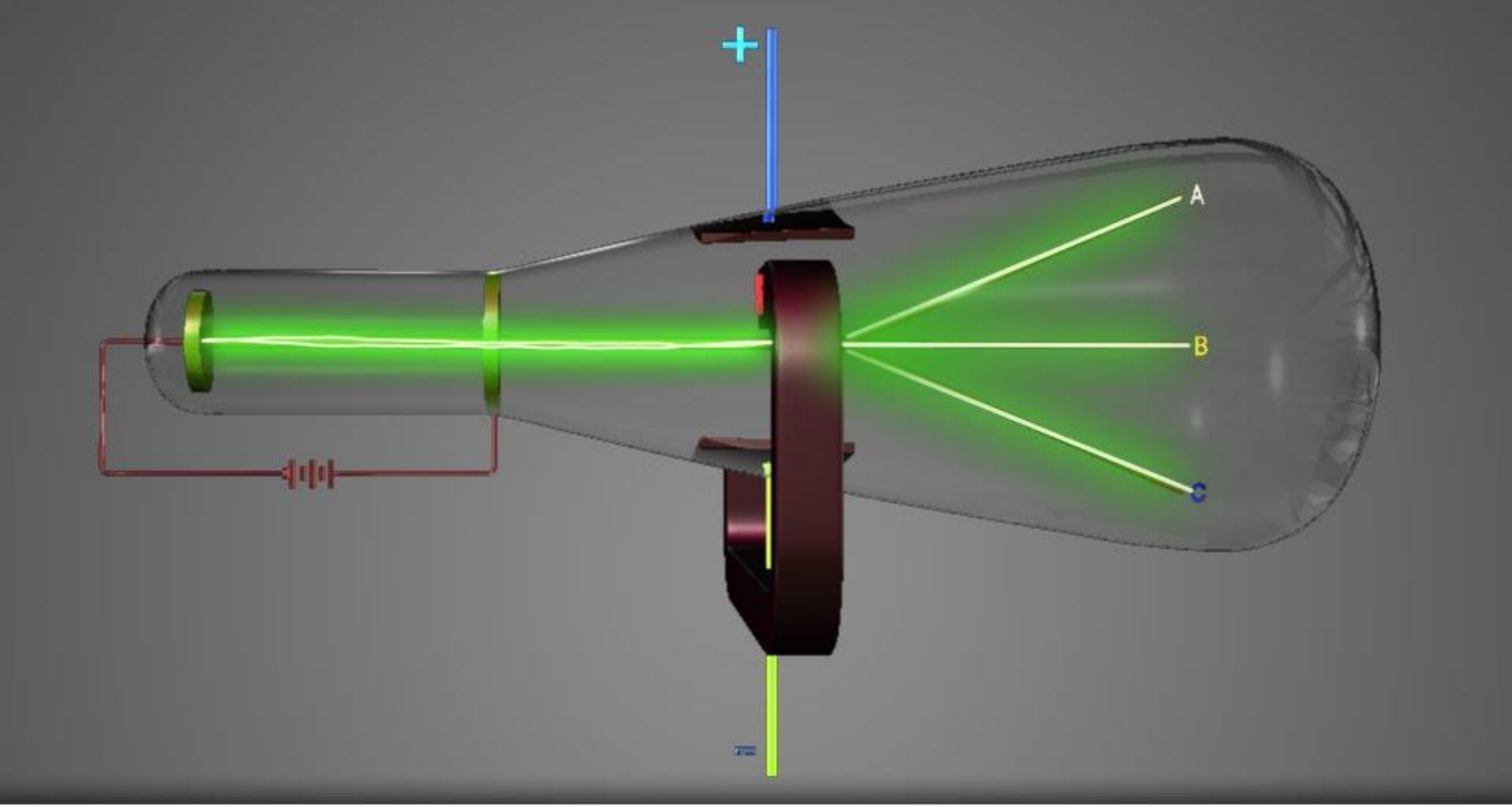
Discovery of Electrons (Cathode Rays)

A gas discharge tube is fitted with two metallic electrodes acting as cathode and anode. The tube is filled with a gas ,air or vapours of substance at any desired pressure. The electrodes are connected to source of high voltage. The exact voltage required depends upon length of tube and pressure inside tube. The tube is attached to vacuum pump by means of small side tube so that conduction of electricity may be studied at any value of low pressure

It is observed that current does not flow through gas at ordinary pressure even at high voltage of 5000 volts. When pressure inside tube is reduced and high voltage of 5000-10000 volts is applied, then an electric discharge takes place through the gas producing a uniform glow inside tube.

DISCHARGE TUBE-EXPERIMENT:

- **DISCHARGE TUBE EXERIMENT: In the latter half of the 19th century scientist studied the discharge of electricity between two electrodes through gases. It was found that electricity flows better through air at low pressure.**
- **GAS DISCHARGE TUBE**
- **It is a glass tube having two metallic electrodes sealed in it.**
- **It may contain a gas, air or vapours of any substance.**
- **This tube can be connected to a vacuum pump to maintain any low pressure.**
- **The electrodes are connected to a high voltage battery.**
- **A slit can be used in it to get a sharp beam of radiations.**
- **EXAMPLE :A Neon sign is also a discharge tube, which contain neon gas at a pressure of about 10 torr.**



CATHODE RAY DISCHARG TUBE CONSTRUCTION

WORKING:

- **WORKING OF DISCHARGE TUBE (DISCOVERY OF CATHODE RAYS/ELECTRONS)**
- **In a discharge tube first an electric current was passed through the gas at normal pressure. The gas remained unaffected even at high potential of 5000 volts.**
- **When the pressure is reduced below 4 torr ,the discharge tube is filled with bright glow.**
- **At low pressure of 0.01 torr and high voltage of 5000 - 10,000 volts, he original glow disappears .The current start to flow through the gas and light is emitted.Modern example of discharge tube is "a neon sign".**
- **When the pressure is reduced further,light emission by the gas stops.At this point some rays were given out from the cathode and they travel towards anode.**
- **These rays are called cathode rays since they originate from cathode.**

CONCLUSION:

- **CONCLUSION:**
- **J.J. Thomson first identified the electrons in discharge tube in 1887.**
- **Others scientists like Faradays &Crooks studied the effects of passing electric current through a gas.**
- **Finally ,a sub –atomic particle with negative charge was discovered.**
- **MAIN SUB-ATOMIC PARTICLES :**
- **FUNDAMENTAL PARTICLES OF ATOM: The atoms are made up of sub-atomic particles electron, protons and neutron. These three particles are called elementary or fundamental particles because they are building block of all atoms. Many properties of atoms depends upon these particles.**
- **Some other sub-atomic particles are neutrino, antineutrino, positrons pions and muons .Many of these are unstable and exist for a fraction of second only.**

HISTORY:

- **HISTORY OF FUNDAMENTAL PARTICLES OF ATOMS:**
- **Electrons were discovered by J.J Thomson in 1887.**
- **The name electron was given by Stoney in 1886.**
- **Protons were discovered by Goldstein in1886.**
- **The name proton was given by Rutherford.**
- **Neutrons were discovered by James Chadwick in 1932.**
- **DISCOVER OF ELECTRONS: The electrons were first identified by cathode ray tube(electric discharge tube) by J.J Thomson in 1887.Many other scientists like Faradays ,Crooks and Goldstein studied the effect of passing electric current through a gas. As a result a sub-atomic particle ,with a negative charge was discovered.**

Properties of Cathode Rays

–Cathode rays travel in straight lines thus they cast a shadow on a screen – Maltese Cross experiment.

–Cathode rays are deflected by a magnetic field.

–Cathode rays are deflected by an electric field.

–Cathode rays convey negative charges.

–Cathode rays convey energy.

Properties of Electron Beams (Cathode rays)

- Cathode rays travel in straight lines.
- Cathode rays can cause fluorescence.
- Cathode rays possess kinetic energy.
- Cathode rays can be deflected by electric field and magnetic field.
- Cathode rays may produce heat and X-rays.
- Cathode rays can affect photographic plates.

Today's Learning

Don't forget to put your name on!

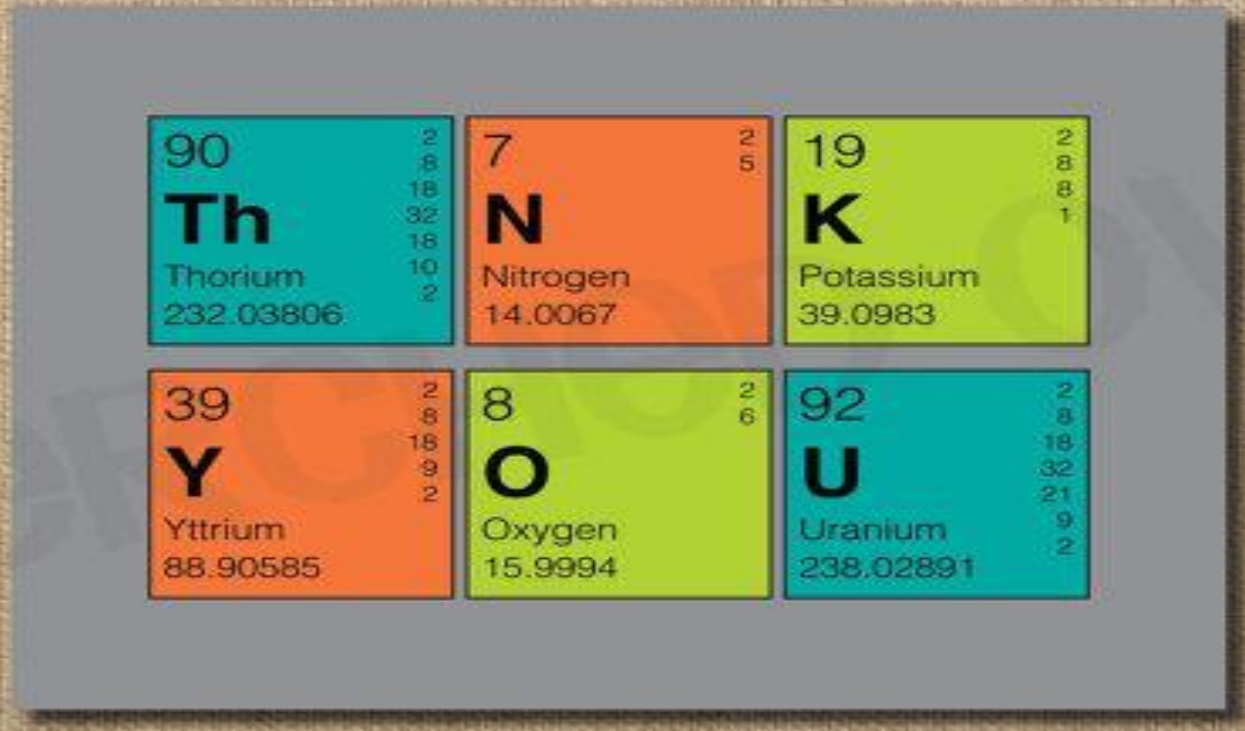
Something I can do now that I couldn't do before the lesson is...	A question I would like to know the answer to is...	I need to improve on...

HOME-WORK:

- NOTE:ATTEMPT ANY ONE QUESTION:
- Explain the working of the discharge tube?
- Explain the construction of the discharge tube?
- Write the properties of cathode rays ?
- Write a note on history of fundamental particles?

LESSON CLOSURE:


good bye
good bye
SCHOOL BUS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Thank
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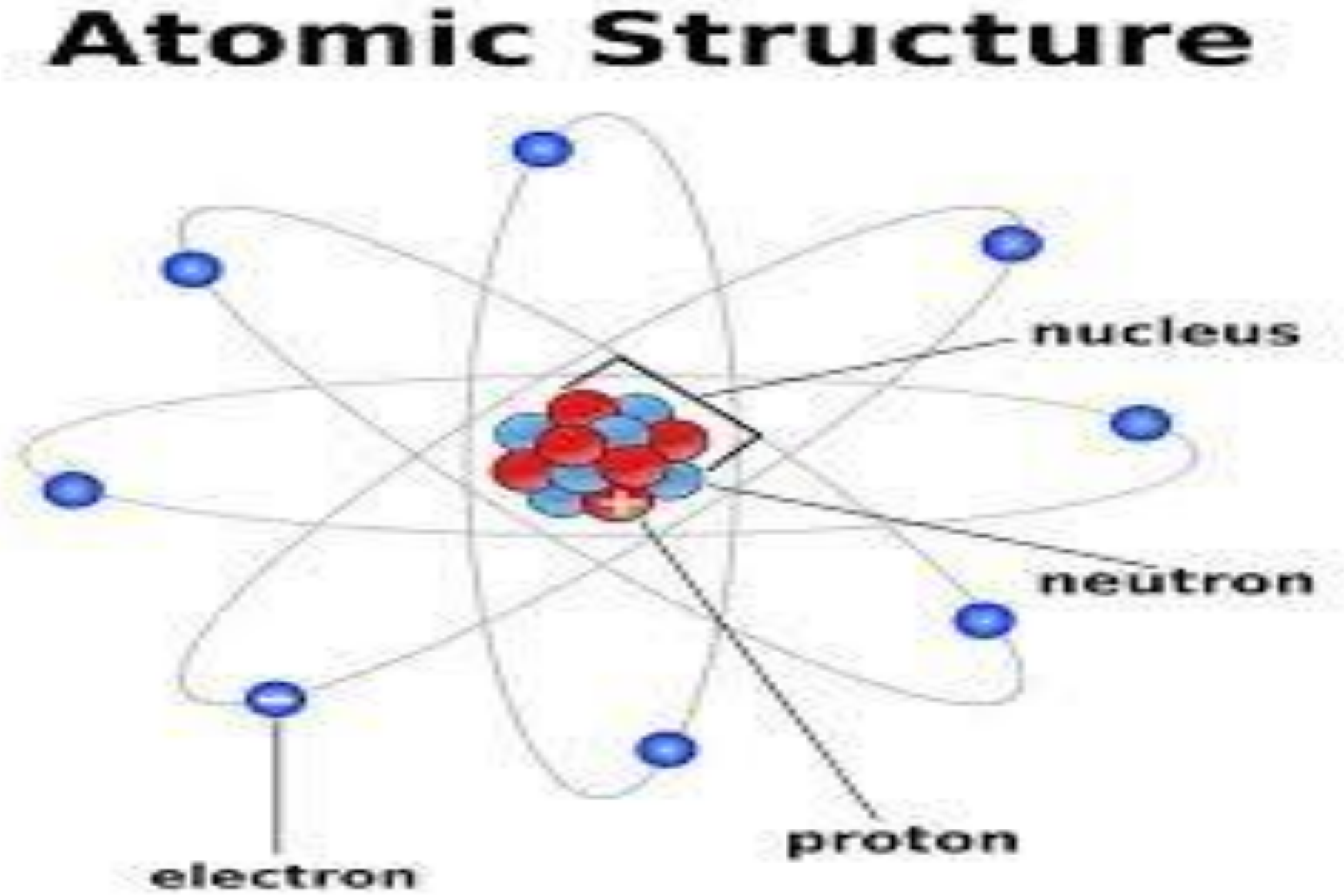
TAKE CARE

LECTURE NO:2



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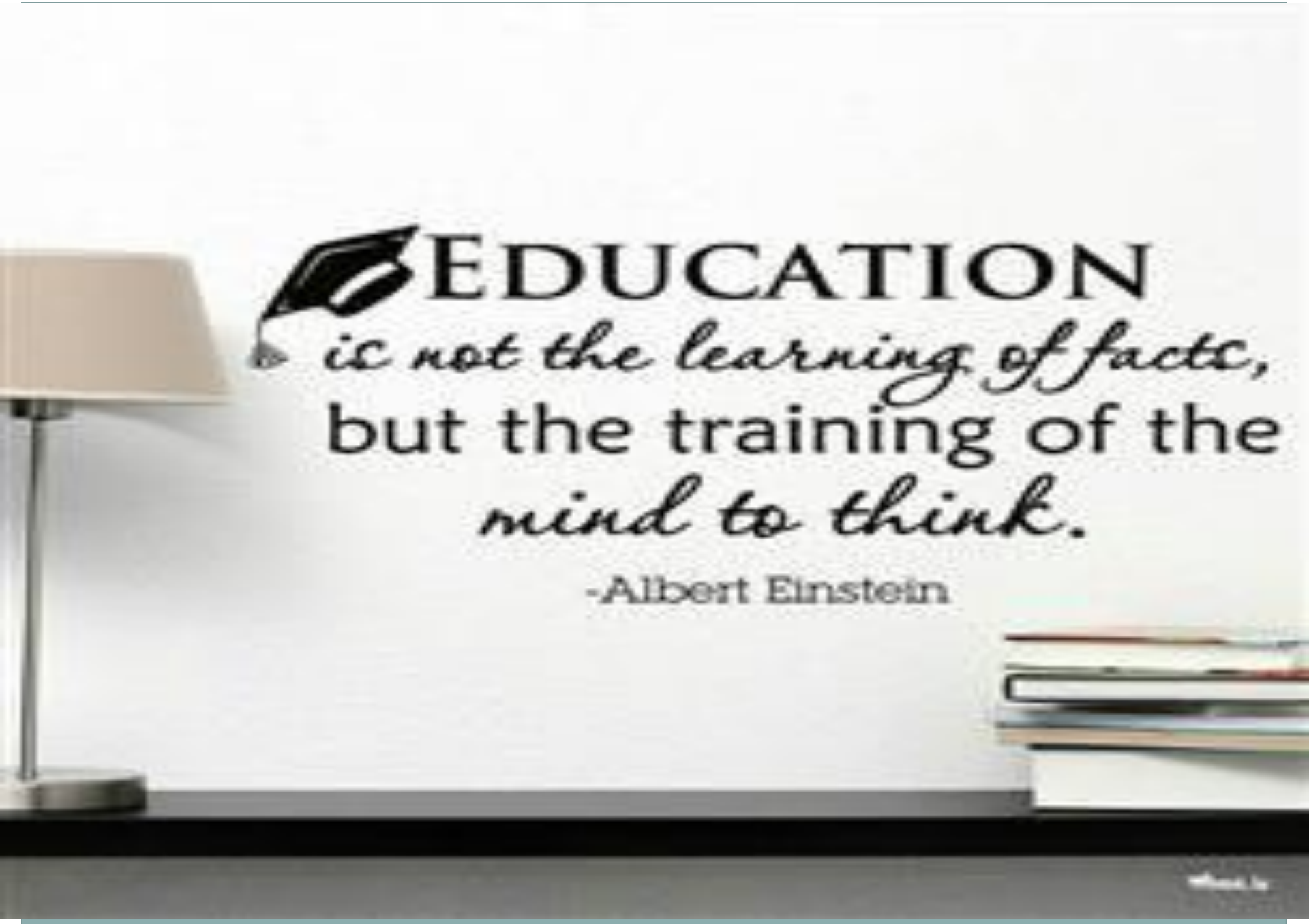
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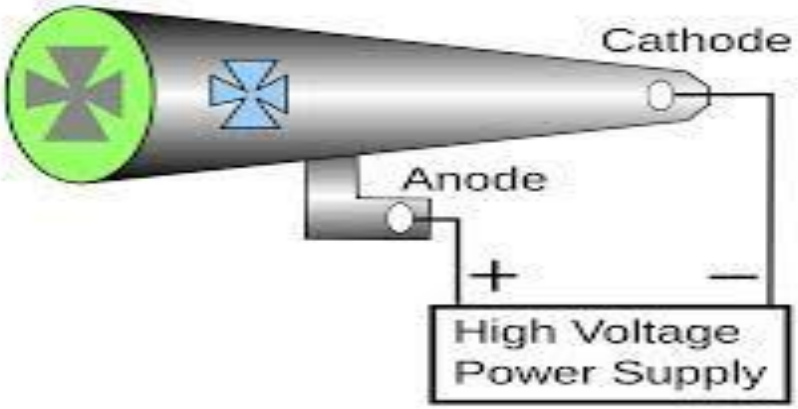
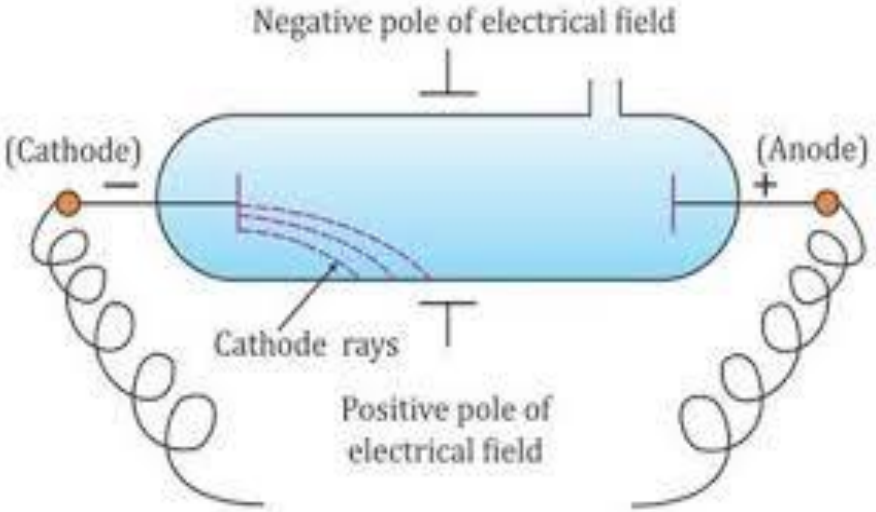
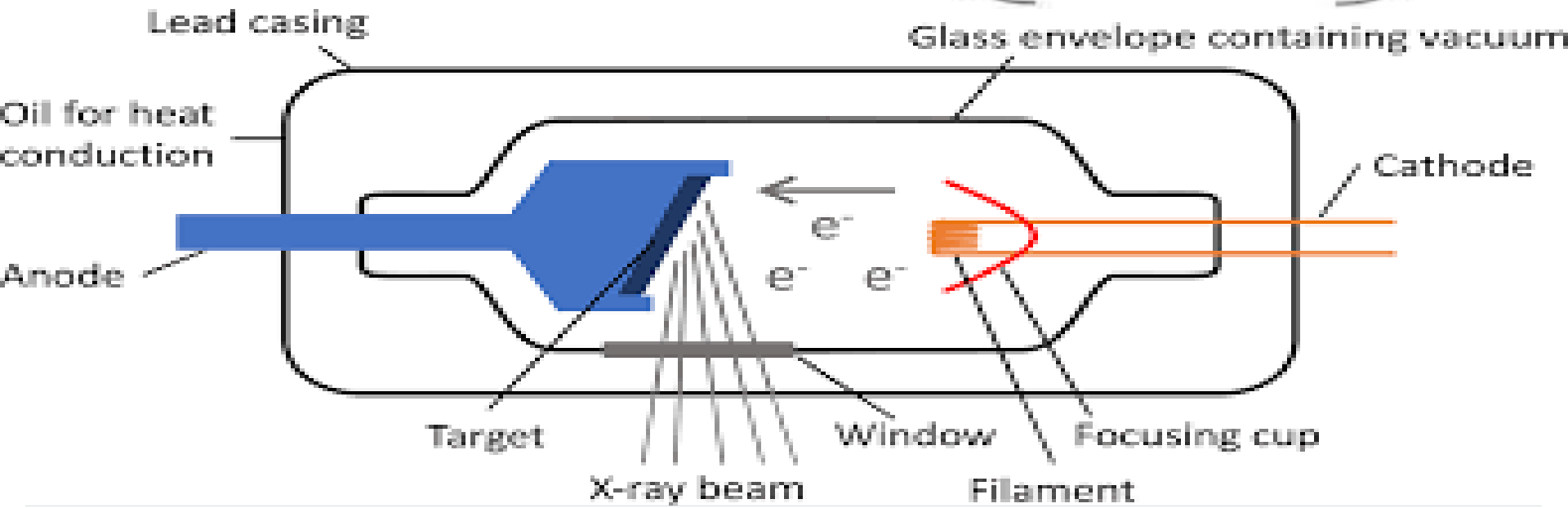






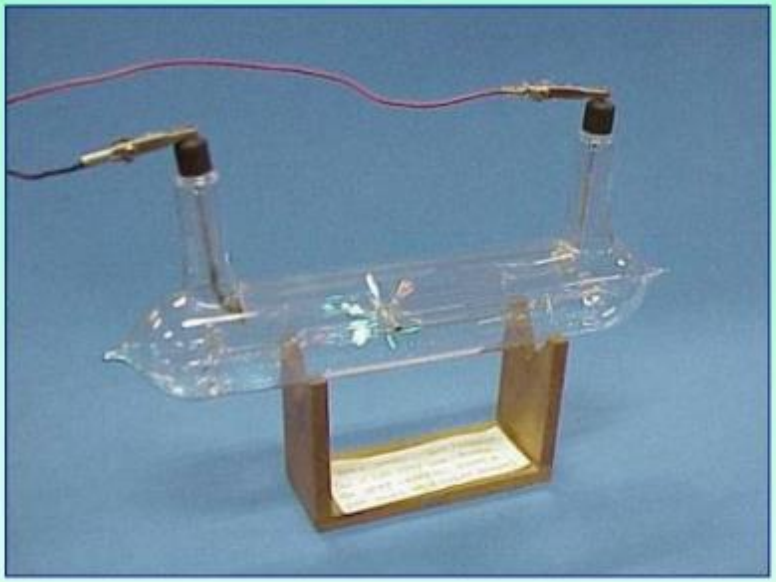
LESSON OBJECTIVES:2

- BY THE END OF THIS PART OF LESSON,STUDENTS WILL BE ABLE TO:
- Define cathode rays ?
- Cathode rays have momentum.
- Cathode rays casts shadow.
- Cathode rays are energentic rays.
- Cathode are negatively charged particles.
- Understand properties of cathode rays.

PROPERTIES:

- **Write the properties of Cathode rays/electrons?**
- **PROPERTIES OF CATHODE RAYS:**
- **CATHODE RAYS TRAVELS IN A STRAIGHT LINE: Hittorf (1886) proved that cathode rays cast a sharp shadow when an opaque object is placed in their path. This proves that they in a straight line perpendicular to the surface of cathode.**
- **CATHODE RAYS POSSESS MOMENTUM :They can drive a small paddle wheel placed in their path. This verifies that they are material particles and have certain momentum also.**
- **CATHODE RAYS ARE NEGATIVELY CHARGED: Cathode rays are negatively charged particles. J-Perrin (1885)showed that cathode rays are deflected in a magnetic field. J.J Thomson (1897) proved that these rays can be deflected towards anode showing that they are negatively charged. They produce a green fluorescence on striking the wall of the glass tube.**
- **CATHODE RAYS CAN PRODUCE X-RAYS: They can produce x-rays when they strike on an anode particularly with large atomic number.**

Paddle Wheel Discharge Tube and Cathode Rays



This cathode ray tube contains a small paddle wheel free to roll on its axle along glass tracks.

Cathode rays cause hit the paddle wheel, causing it to turn and move along the track.

This demonstrates that cathode rays have momentum.

PROPERTIES :

- **CATHODE CAN CAUSE CHEMICAL CHANGE: They can cause a chemical change in a material on which they fall.**
- **CATHODE RAYS CAN PENETRATE THROUGH METALLIC SHEETS: They are capable of penetration in metallic sheets like that of Aluminium or Gold.**
- **CATHODE RAYS ARE ENERGETIC RAYS: They produce heat when they fall on platinum foil and the foil begins to glow.**
- **CATHODE RAYS CAN IONIZE GASES: They can ionize gases and convert their molecules into positive ions.**

CONCLUSION OF DISCHARGE TUBE EXPERIMENT:

- **Write the conclusions of discharge tube experiment?**
- **J . J. Thomson determined e/m value of an electron.**
- **He concluded that all atoms contain electrons.**
- **The value of e/m is 1.755×10^{11} coulombs/kg.**
- **The nature of cathode rays is independent of the gases and the vapours in the discharge tube. This proves that electrons are fundamental particles of all atoms.**

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Something I can do now that I couldn't do before the lesson is...	A question I would like to know the answer to is...	I need to improve on...

HOME-WORK:

- NOTE:ATTEMPT ANY ONE QUESTION:
- Write the properties of cathode rays?
- Prove with the help an experiment that cathode rays have momentum?
- Write the conclusion of discharge tube experiment?

LESSON CLOSURE:


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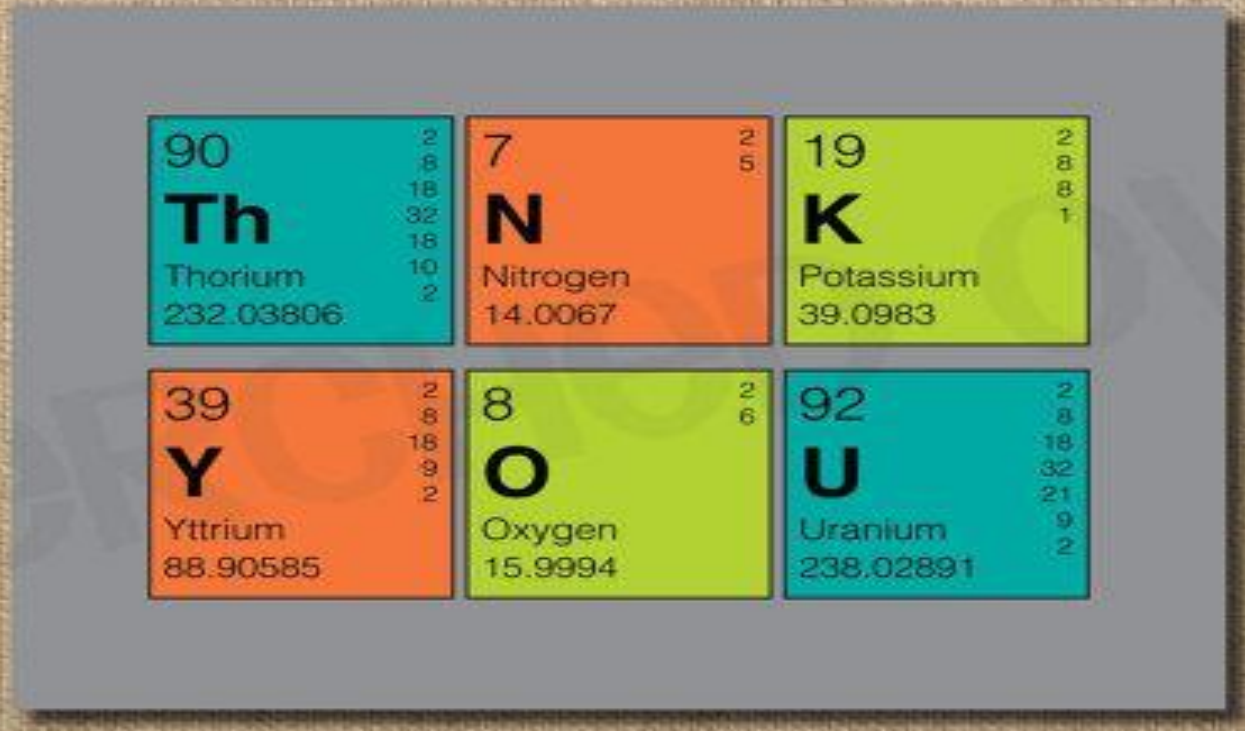
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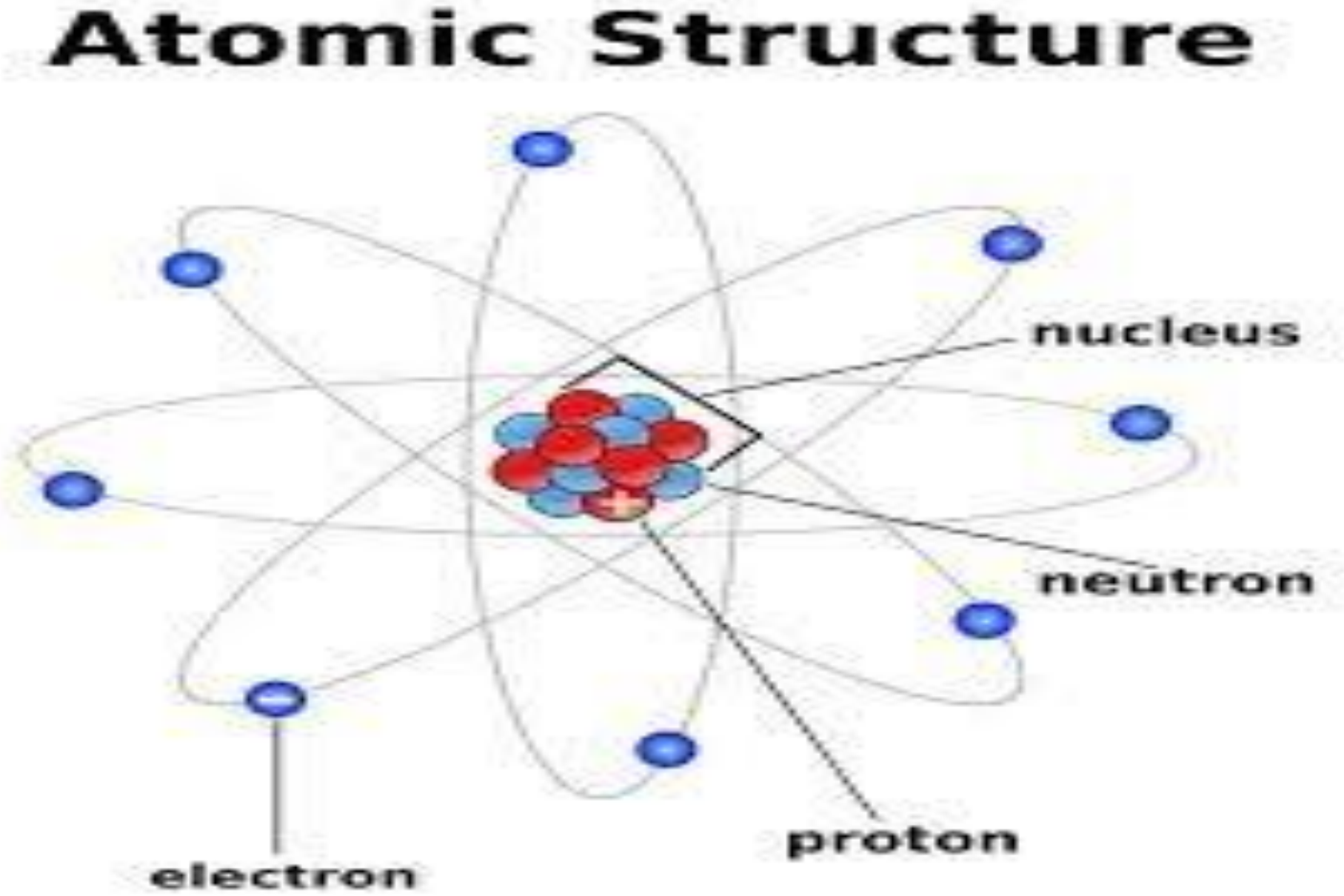

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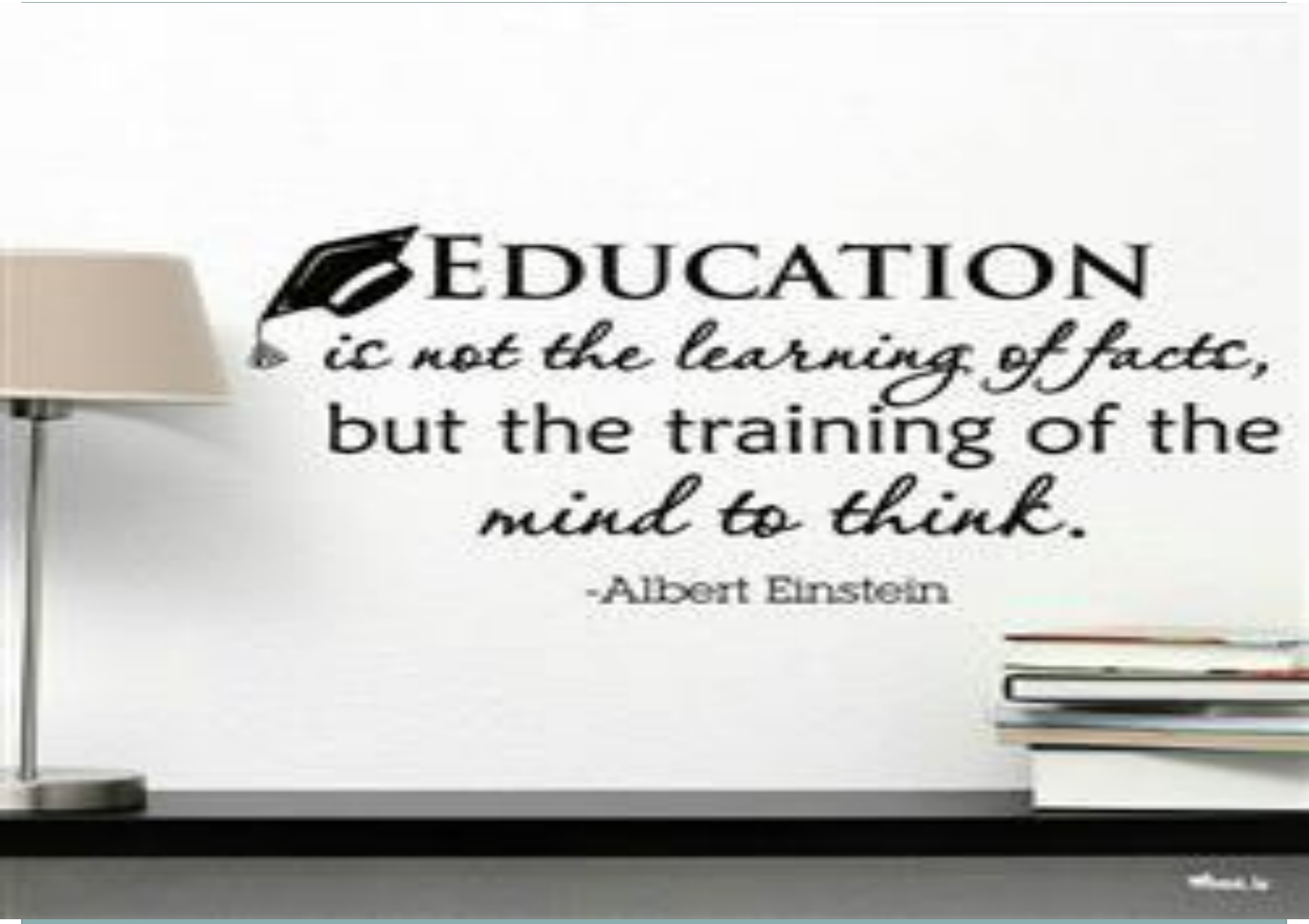
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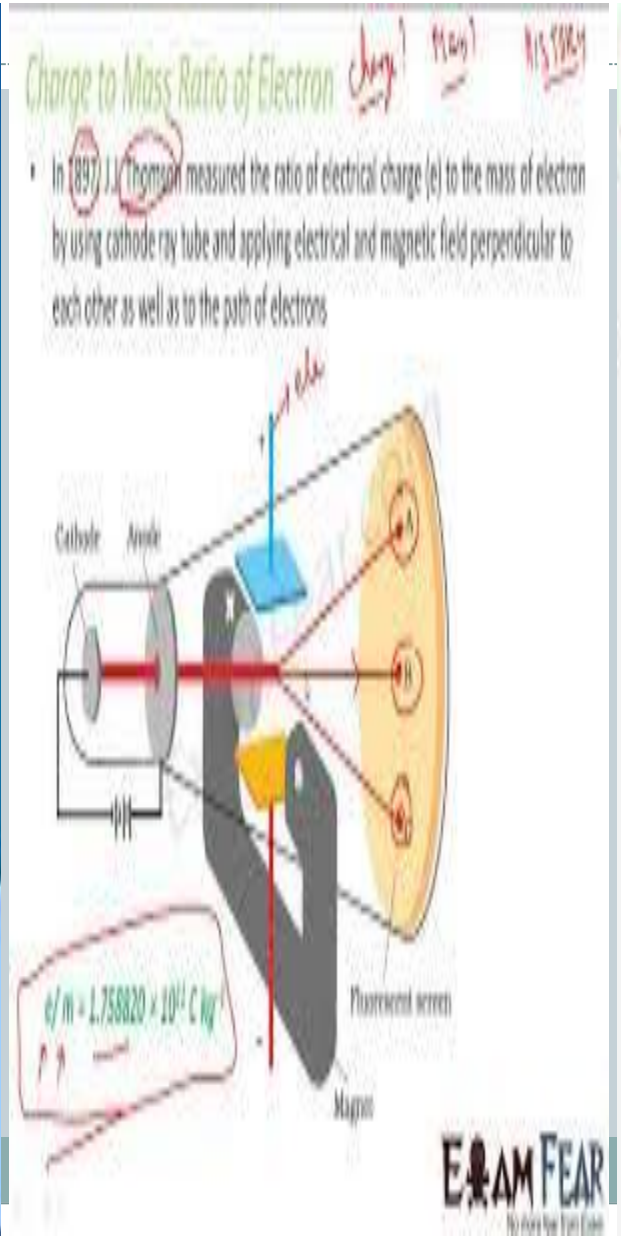
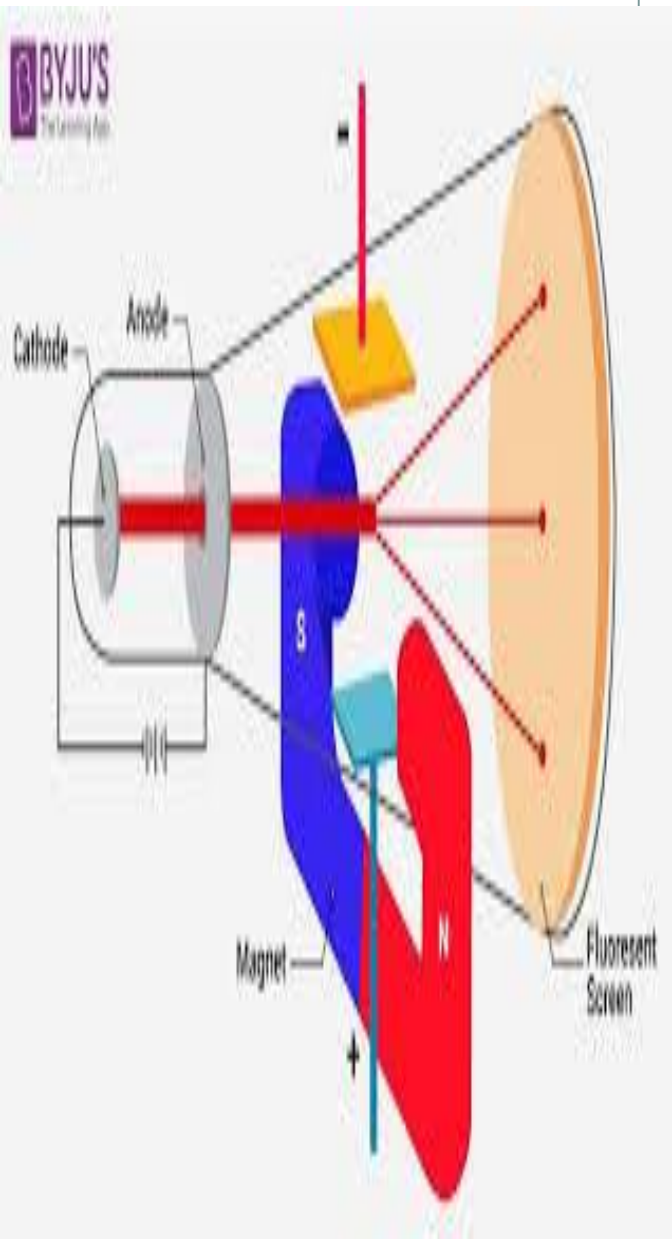
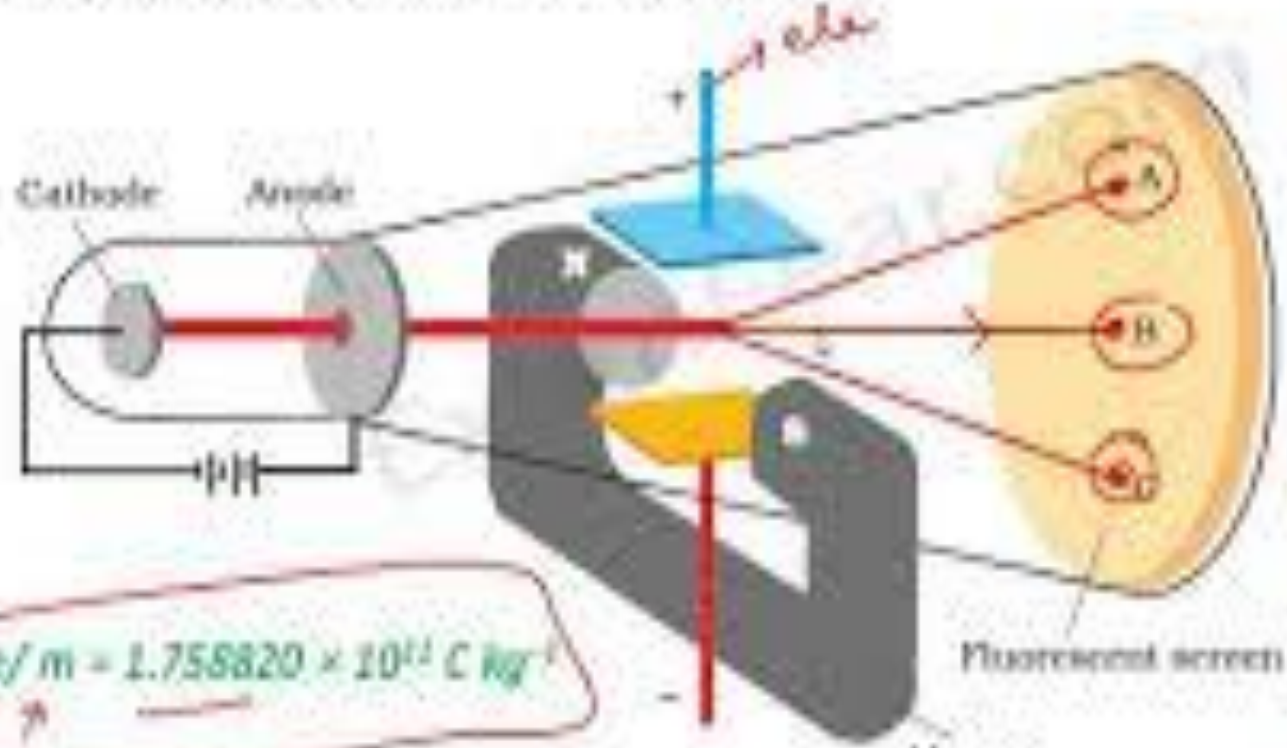




POINTS TO PONDER:

Charge to Mass Ratio of Electron

- In 1897 J.J. Thomson measured the ratio of electrical charge (e) to the mass of electron by using cathode ray tube and applying electrical and magnetic field perpendicular to each other as well as to the path of electrons



$e/m = 1.758820 \times 10^{11}$ C kg^{-1}

LESSON OBJECTIVES:3

- BY THE END OF THIS PART OF LESSON,STUDENTS WILL BE ABLE TO:
- How to calculate the charge to mass ratio of an electron?
- What is the value of charge to mass ratio of an electron?
- Design of Millikan's oil drop experiment ?
- Construction of Millikan's oil drop experiment?

WORKING/RESULT :

- **Explain the working and result of J.J .Thomson cathode ray experiment?**
- **MEASUREMENT OF CHARGE TO MASS (e/m)RATIO OF AN ELECTRON.**
- **(J.J. Thomson cathode ray experiment 1897).J .J. Thomson determined the e/m ratio of cathode (electron) rays in 1897.But he could not determine the charge or mass of the electrons separately.**
- **WORKING:**
- **He subjected the beam of cathode rays to the simultaneous effects of electric and magnetic field.**
- **In the absence of electric & magnetic field, the electrons strike at B.**
- **When only electric field is applied the electrons strikes at A.**
- **When only magnetic field is applied, the electrons strikes at C.**
- **Now the strength of electric and magnetic field are so adjusted that the electrons strikes at B.**
- **RESULT: From the comparsion of strengths of electric and magnetic fields e/m ratio is calculated .The calculated value of e/m is $1.7588x10^{11}$ coulombs/kg. It means that one kg of electron carries a charge of $1.7588x10^{11}$ coulombs.**

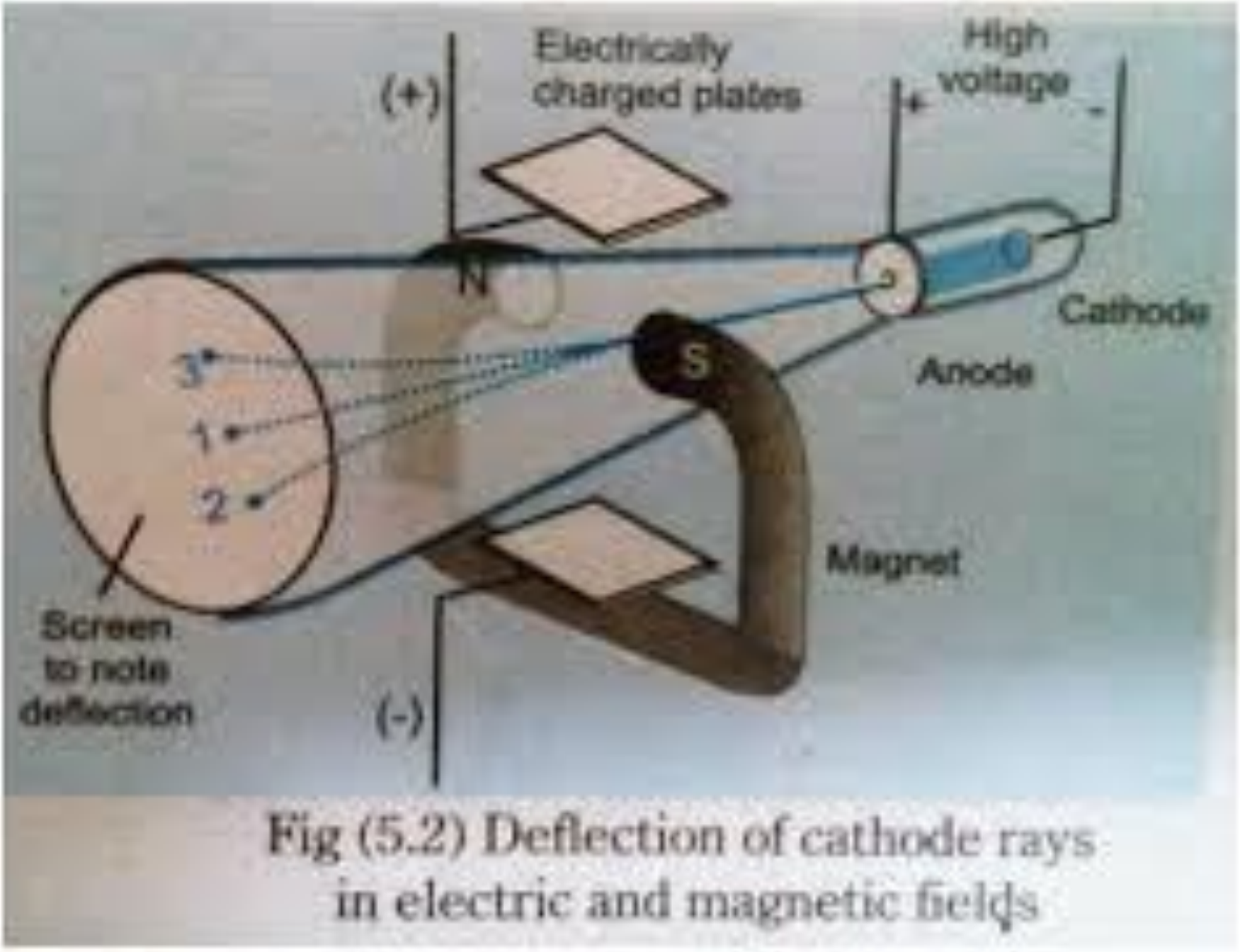
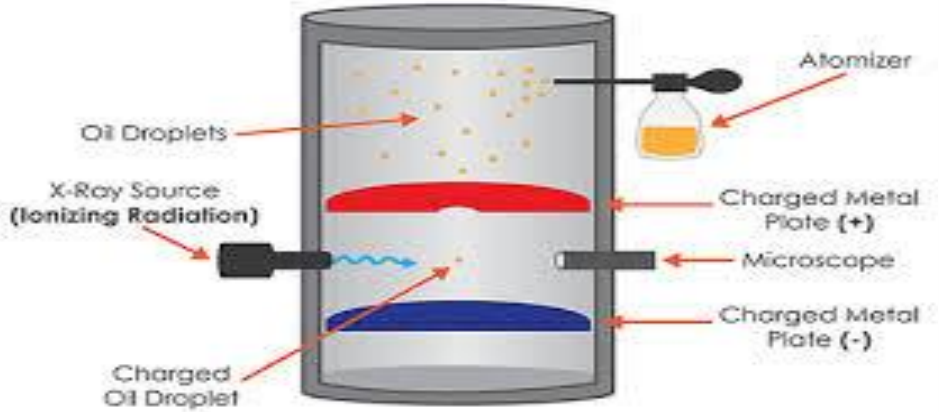
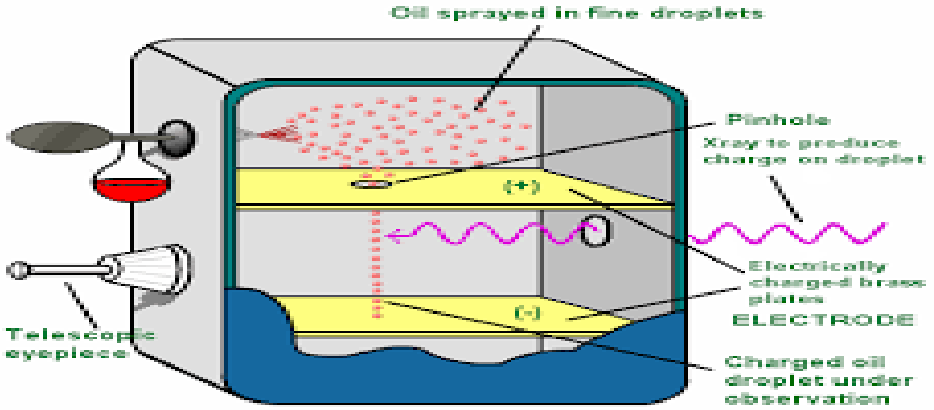
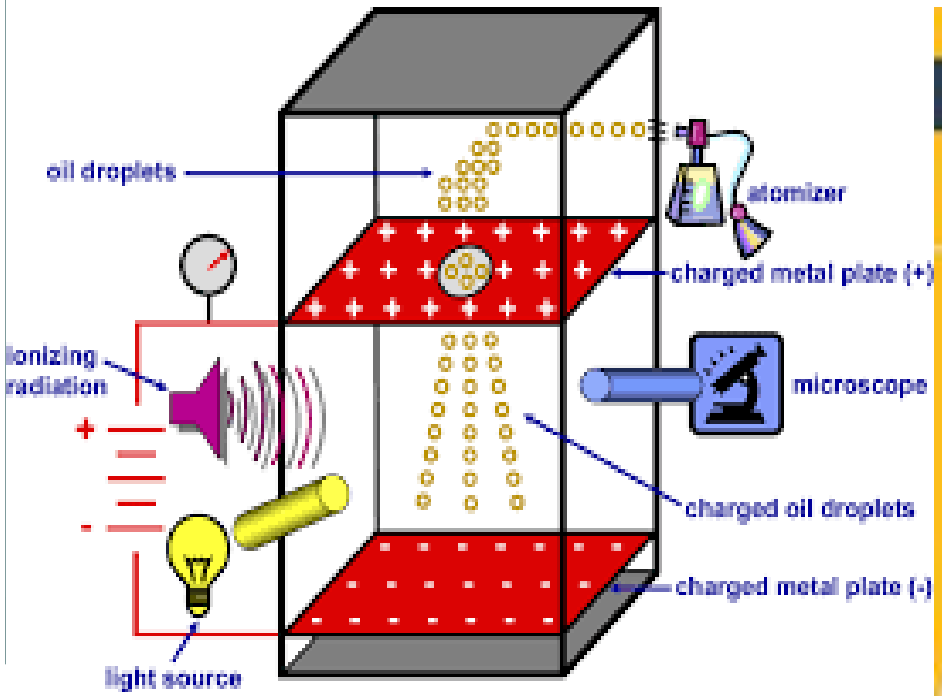


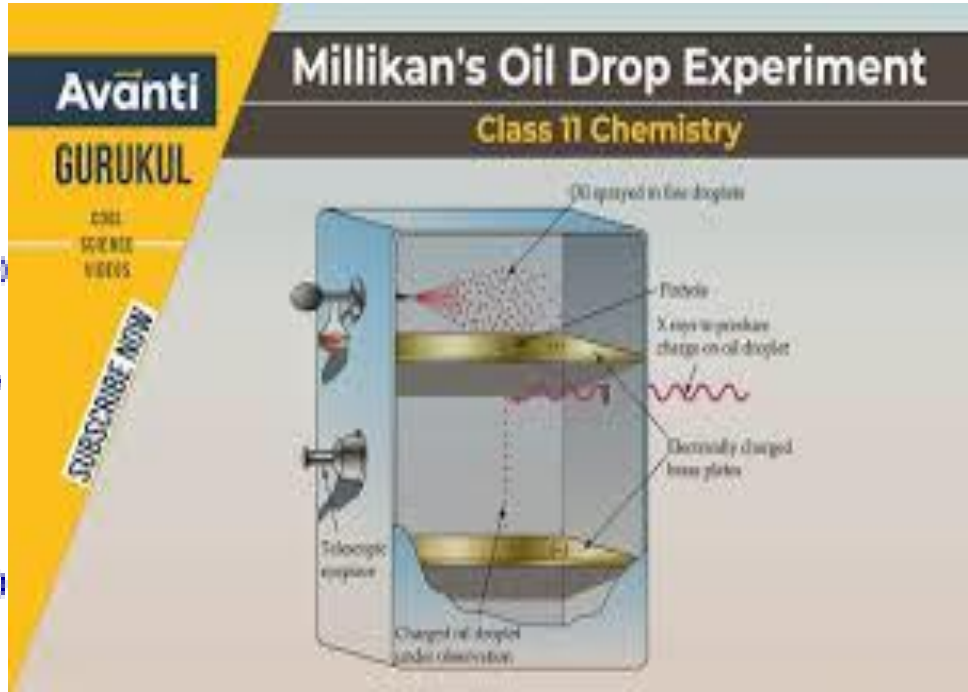
Fig (5.2) Deflection of cathode rays in electric and magnetic fields

POINTS TO PONDER:

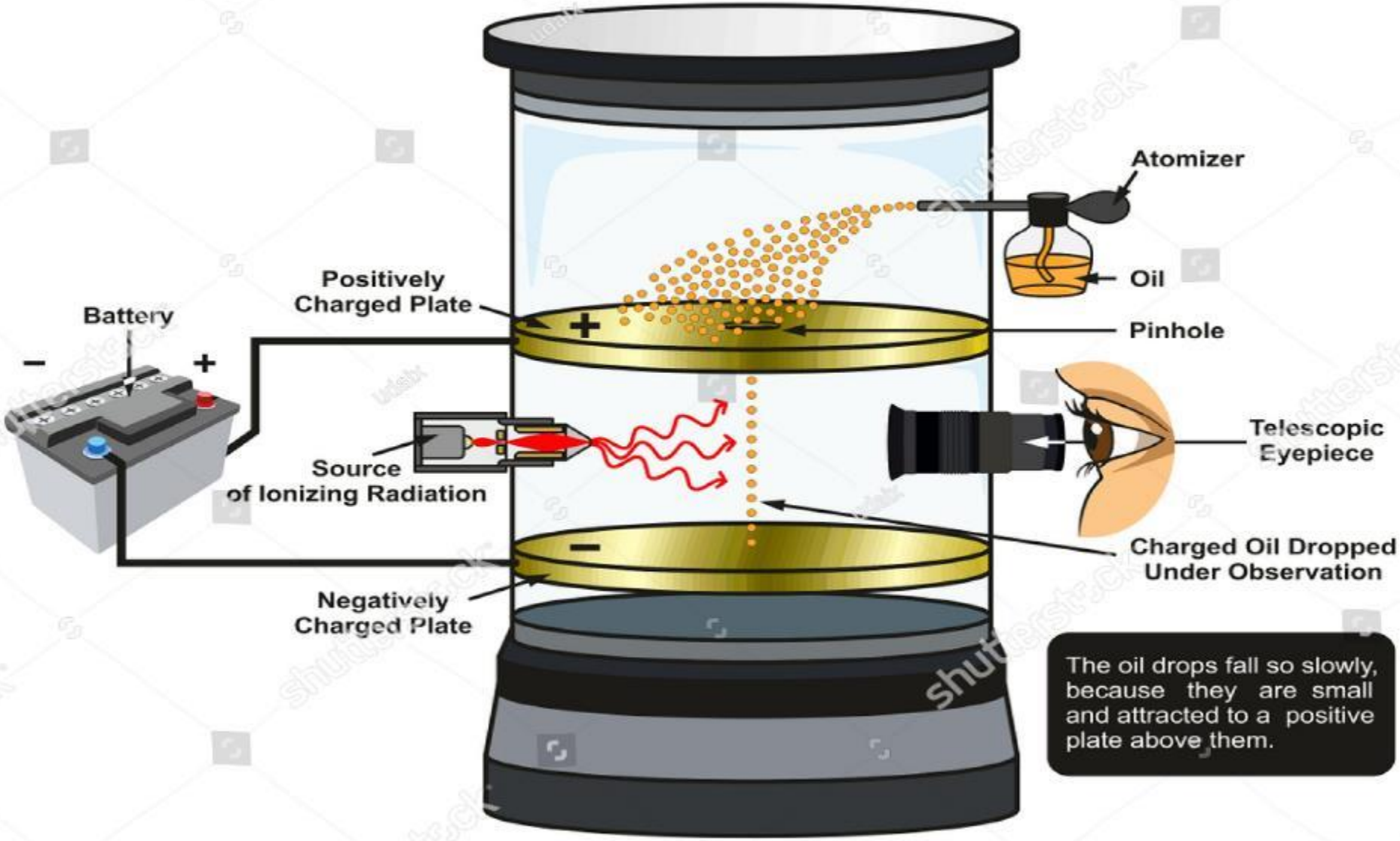






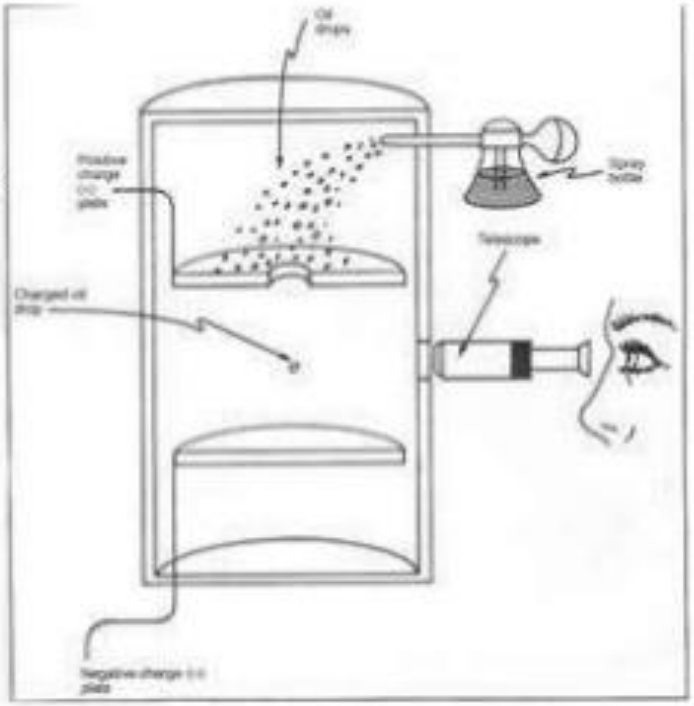


Millikan Oil Drop Experiment



Design of the Experiment

- Plates can be charged. Charge can be varied. Oil drops fall through hole in top plate.
- Electrons are present in these oil drops
- Microscope used for observing drops.



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HOME-WORK:

- NOTE:ATTEMPT ANY ONE QUESTION:
- Explain the working and result of J. J. Thomson cathode ray experiment?
- Explain the construction of Millikan's oil drop experiment?

LESSON CLOSURE:


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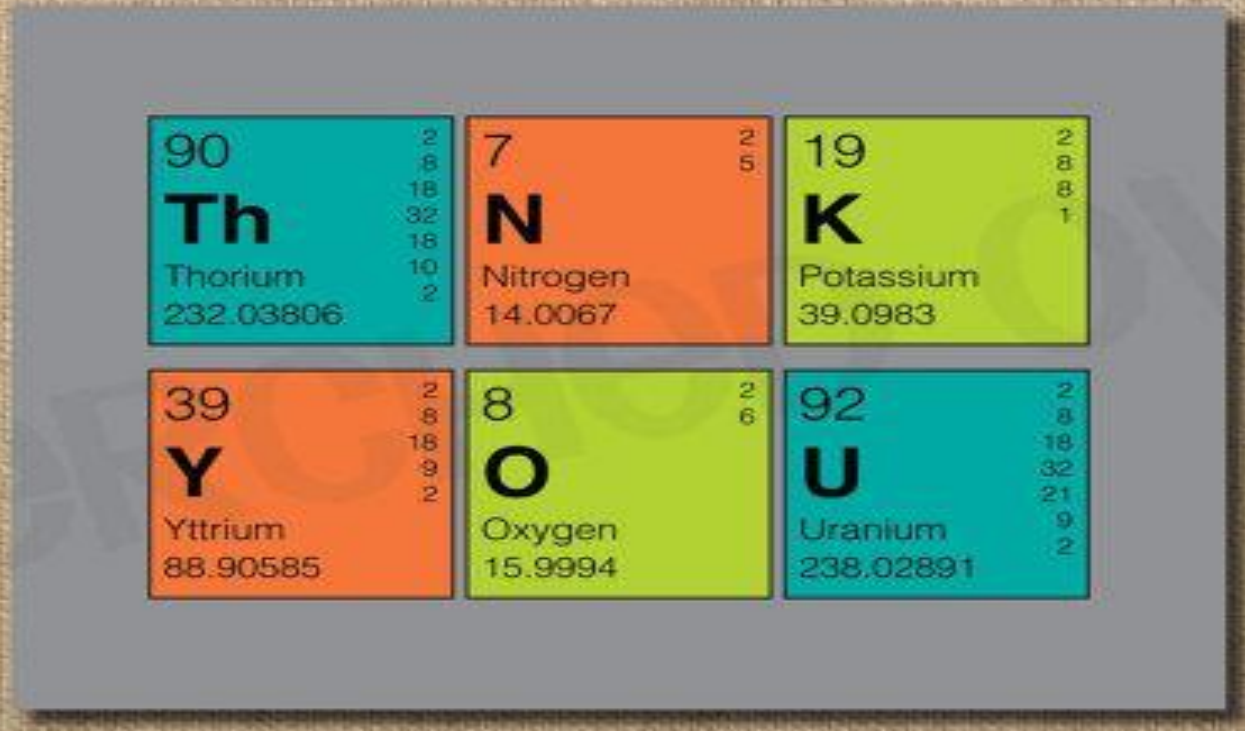
SCHOOL BUS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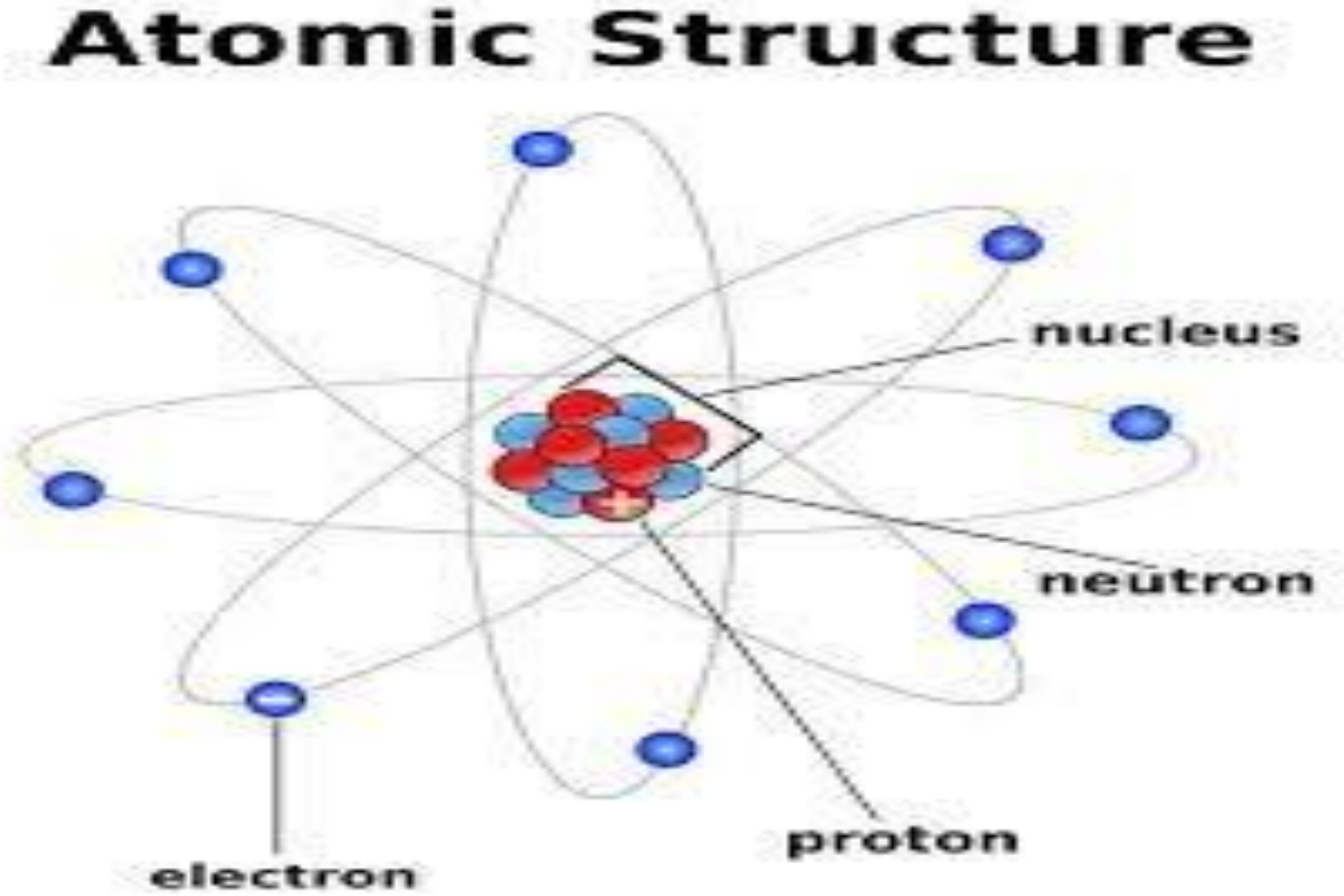

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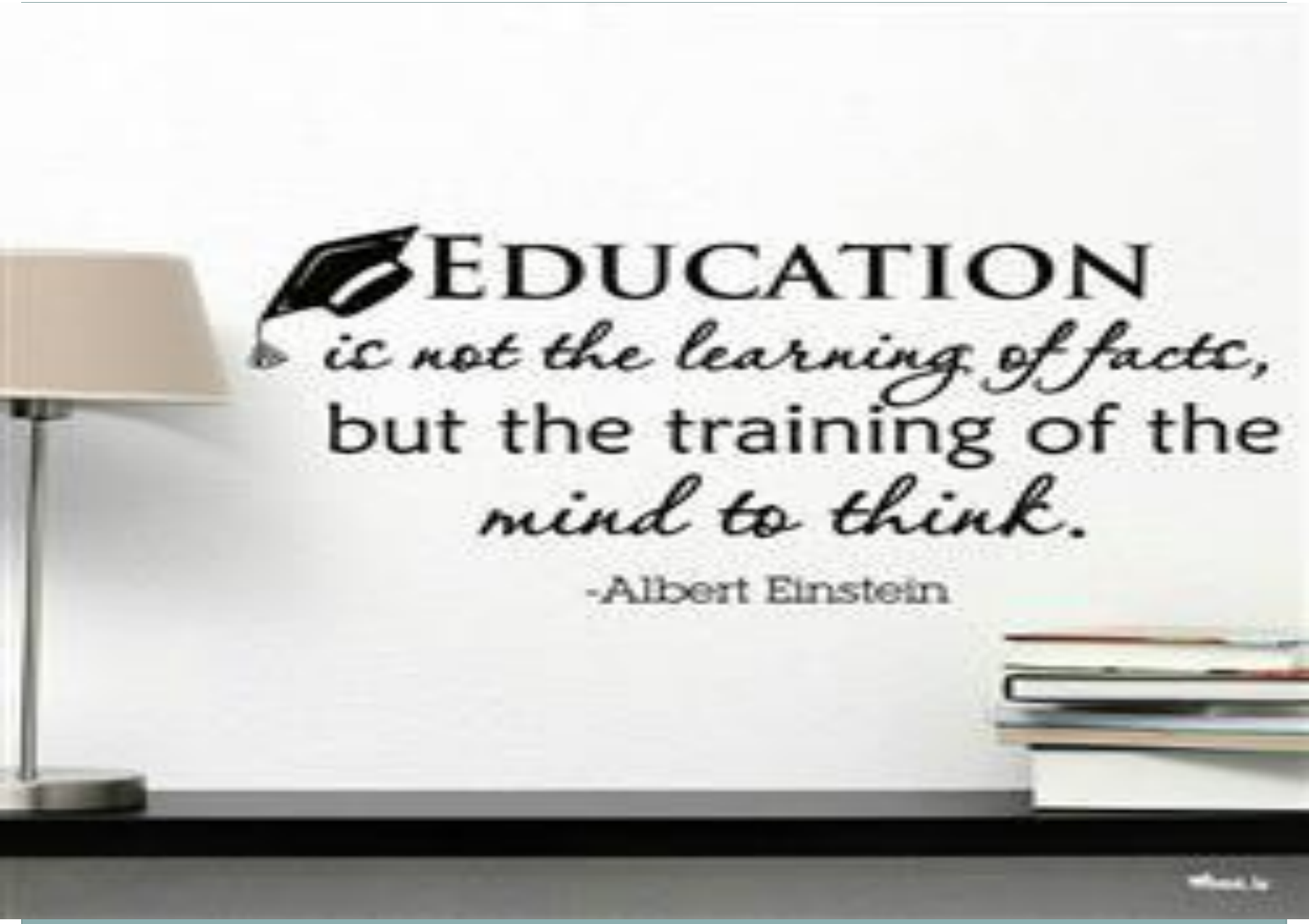
EDUCATION
is not the learning of facts,
but the training of the
mind to think.
-Albert Einstein


WELCOME
BACK


HAHA! SO WE MEET AGAIN!!

>> Ready for Anything

WELCOME BACK TO VIRTUAL CLASSES!

#WEAREALWAYSTOGETHER

AMERICAN

A WARM WELCOME TO ALL THE STUDENTS IN THE ONLINE CLASSES.THIS IS D.CHARLES

WE ARE GOING TO START OUR ONLINE CHEMISRTY LESSON TODAY.I HOPE YOU ALL WILL ENJOY AND LEARN.

.

RULES OF THE CLASS:

1)BE ON TIME FOR ALL YOUR CLASSES.
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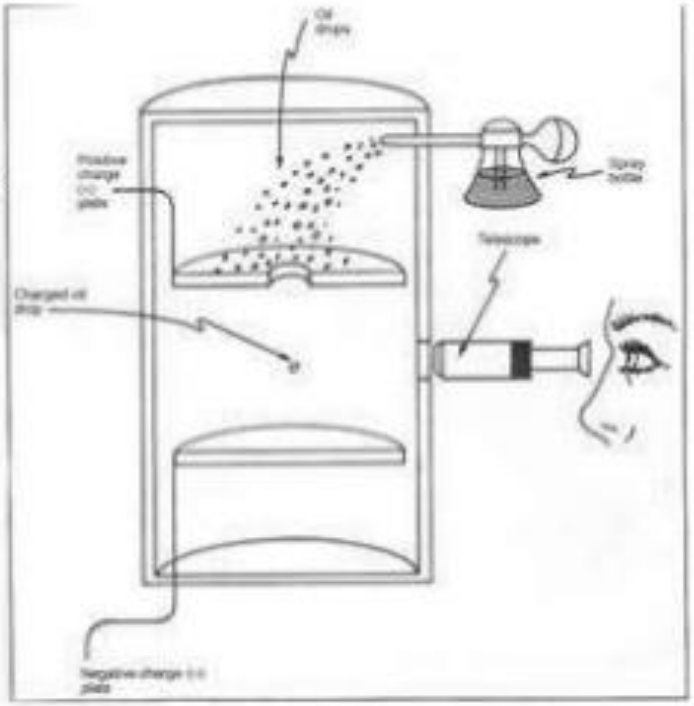
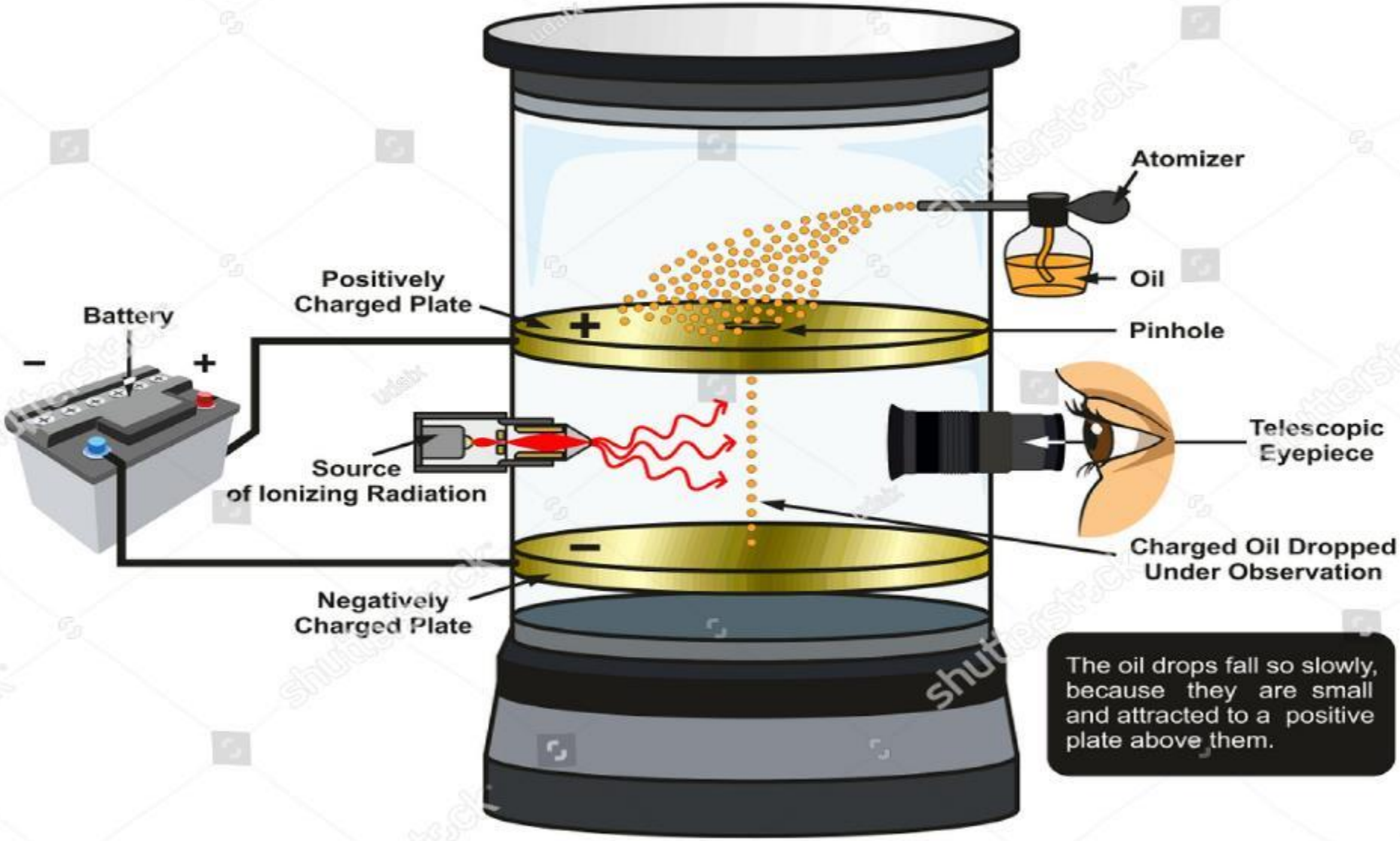
Design of the Experiment

- Plates can be charged. Charge can be varied. Oil drops fall through hole in top plate.
- Electrons are present in these oil drops
- Microscope used for observing drops.



Millikan Oil Drop Experiment



LESSON OBJECTIVES:4

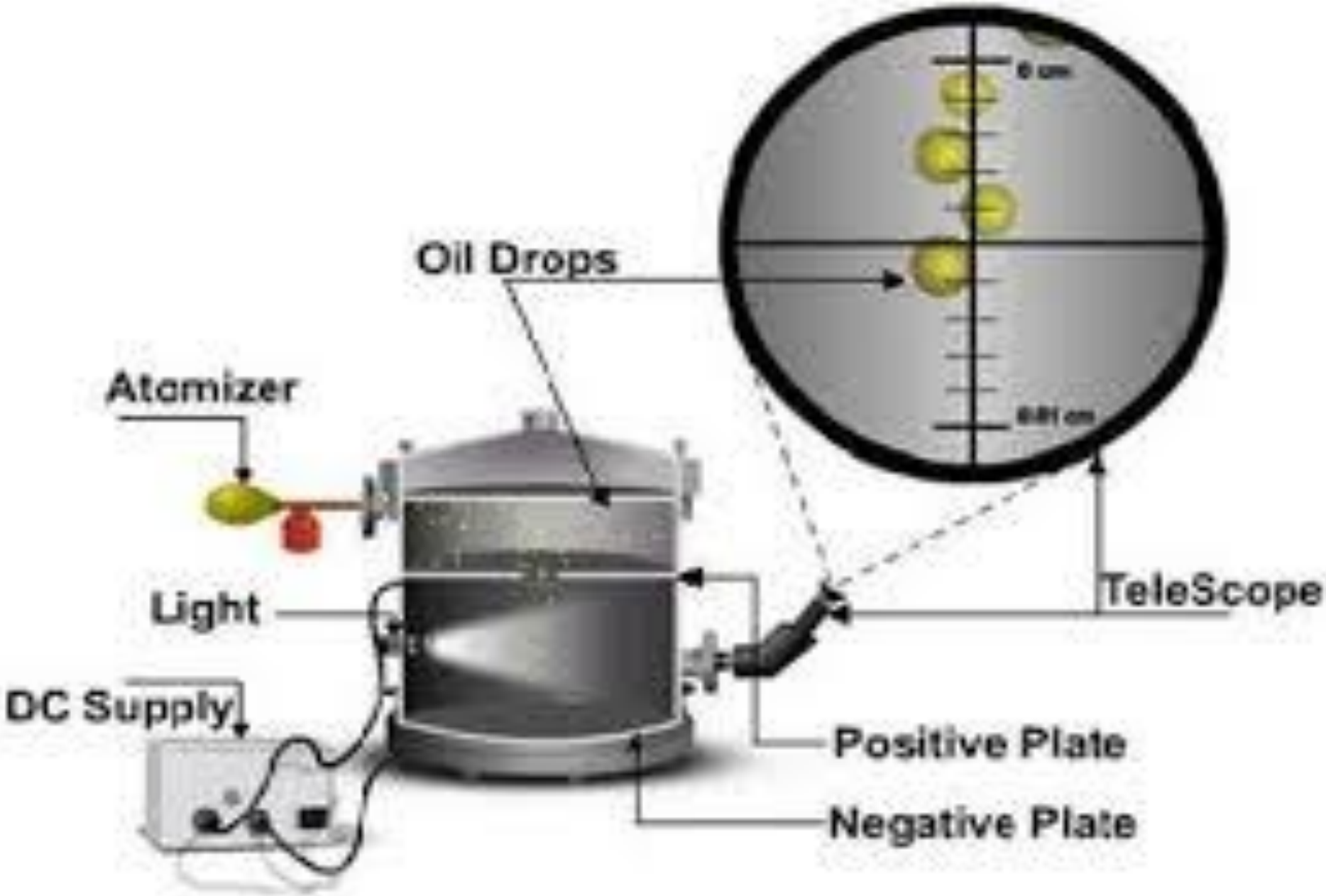
- BY THE END OF THIS PART OF LESSON,STUDENTS WILL BE ABLE TO:
- Design of Millikan's oil drop experiment ?
- Construction of Millikan's oil drop experiment?
- Working and result of Millikan's oil drop experiment?

MILLIKAN'S OIL DROP EXPERIMENT:

- **Explain the construction, working and the result of Millikans oil-drop experiment ?**
- **DETERMINATION OF CHARGE OF ELECTRON/Millikan's oil drop experiment (1909):In 1909 ,R.A.Millikan's**
- **determined the charge of an electron with the help of an experiment.**
- **CONSTRUCTION:**
- **It consists of a metallic chamber.**
- **It has two chambers.**
- **It also has two parallel electrodes A and A_1 in it.**
- **The electrodes were attached with electricity to generate an electric field in the space between the electrodes.**
- **The upper electrode has a hole in it.**
- **The upper chamber was filled with air and its pressure can be adjusted with a vacuum pump.**
- **An arc lamp is used to illuminate the space between the two electrodes.**

WORKING:

- **WORKING:**
- **A fine spray of droplets was created by an atomizer.**
- **Some droplets enters into the hole. Then the hole was closed.**
- **The droplet fall under the action of gravity.**
- **The falling velocity (V_1)of the droplet is directly proportional to its weight.i.e.$V_1 \propto$ mg—(1).where m=mass of droplet. g= acceleration due to gravity.**
- **After that the air between the electrodes was ionized by X—rays.**
- **The droplets under study take electrons from the air and become negatively charged.**
- **The electrodes were then connected to an electric field of strength E.**
- **The oil droplets, being negatively charged, moved upward towards the positively charged plates against the force of gravity with velocity V_2**

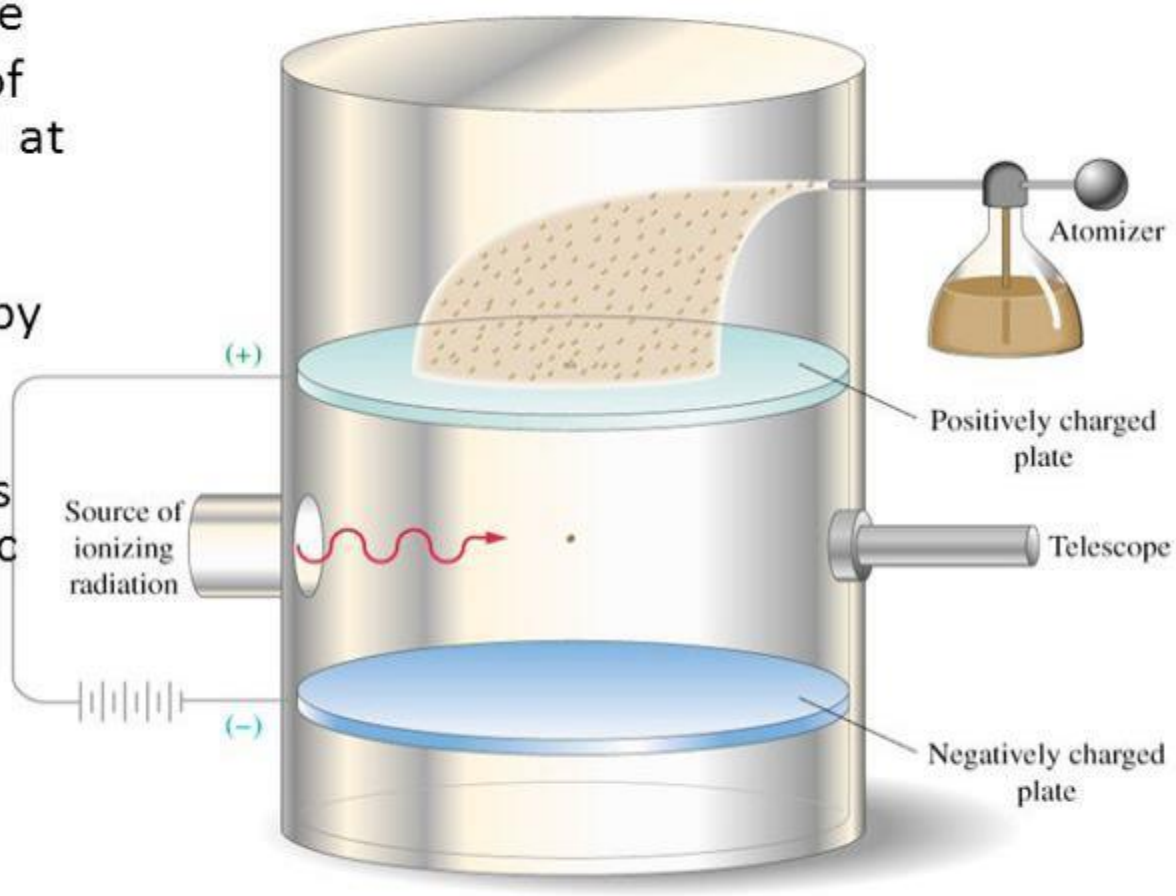

Oil Drops
Atomizer
Light
DC Supply
TeleScope
Positive Plate
Negative Plate

WORKING/RESULT/MASS OF ELECTRON:

- $V_2 \alpha$ Ee-mg------(2).Where e=charge on droplets
- Divide eq.1 by 2
- V_1/V_2=mg/Ee-mg-----(3)
- The strength of the electric field was so adjusted that the droplet becomes stand still.
- Under these condition mass of droplet was determined.
- RESULT: Thus if V_1, V_2E,g and m are known charge on the droplet can be determined using eq.3.Hence "e"can be calculated which is $1.6022x10^{-19}$coulombs.
- DETERMINATION OF MASS OF AN ELECTRON:
- Since e/m =$1.7588x10^{11}$ coulombs/kg. But e =$1.6022x10^{-19}$ coulombs
- $1.6022x10^{-19}$C/m =$1.7588x10^{11}$kg-1/1 OR m x$1.7588x10^{11}$C kg^{-1} =$1.60x10^{-19}$C
- Mass of electron =$1.6022x10^{-19}$ C/$1.7588x10^{11}$ Ckg^{-1}
- MASS OF ELECTRON =9.1O95 $X10^{-31}$Kg.

Millikan's Oil Drop Experiment

- Drops of oil fall through the hole in the top plate
- By measuring the size of the drop and the speed at which it falls you can calculate its mass
- Some become ionised by the radiation source
- By adjusting the pd between the two plates weight and electrostatic force can be equalised: the drop is stationary
- You can then calculate the charge on the drop



Today's Learning

Don't forget to put your name on!

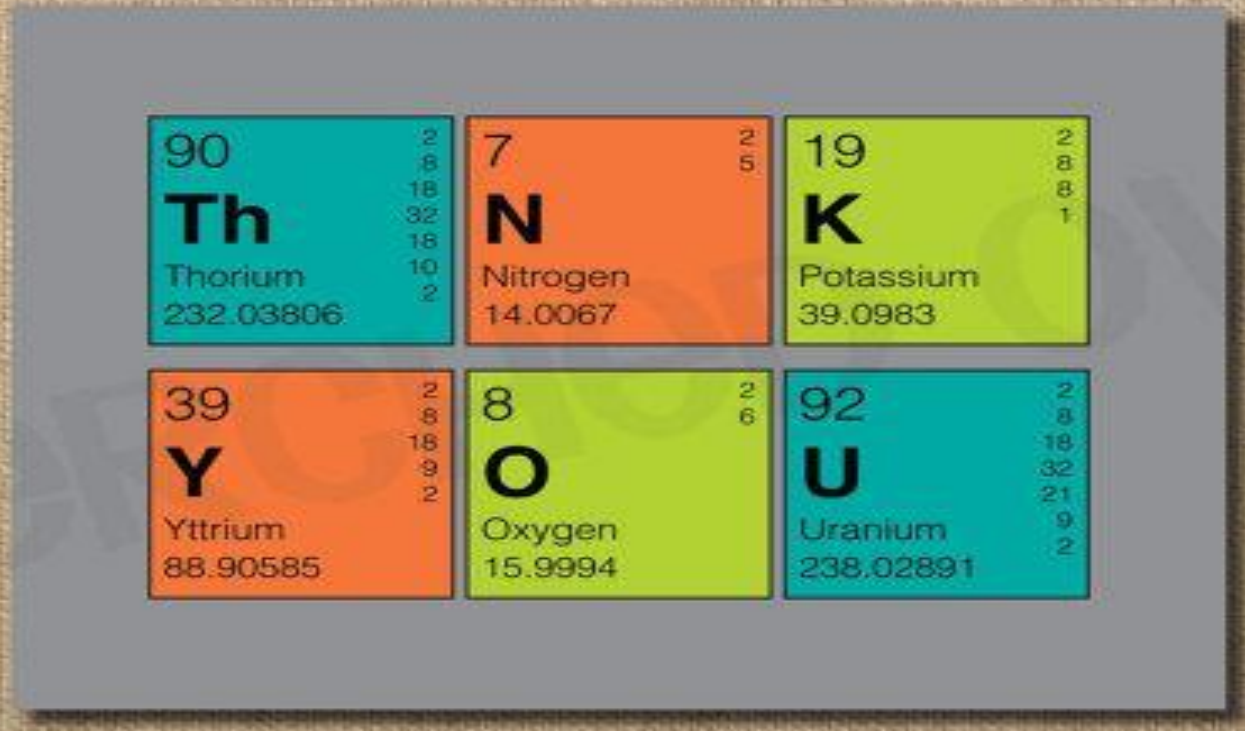
Something I can do now that I couldn't do before the lesson is...	A question I would like to know the answer to is...	I need to improve on...

HOME-WORK:

- NOTE:ATTEMPT ANY ONE QUESTION:
- How to design Millikan’s oil drop experiment?
- Explain the working of Millikan’s oil drop experiment ?
- What Millikan’s achieved through his experiment?

LESSON CLOSURE:


good bye
good bye
SCHOOL BUS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Potassium
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Y
Yttrium
88.90585
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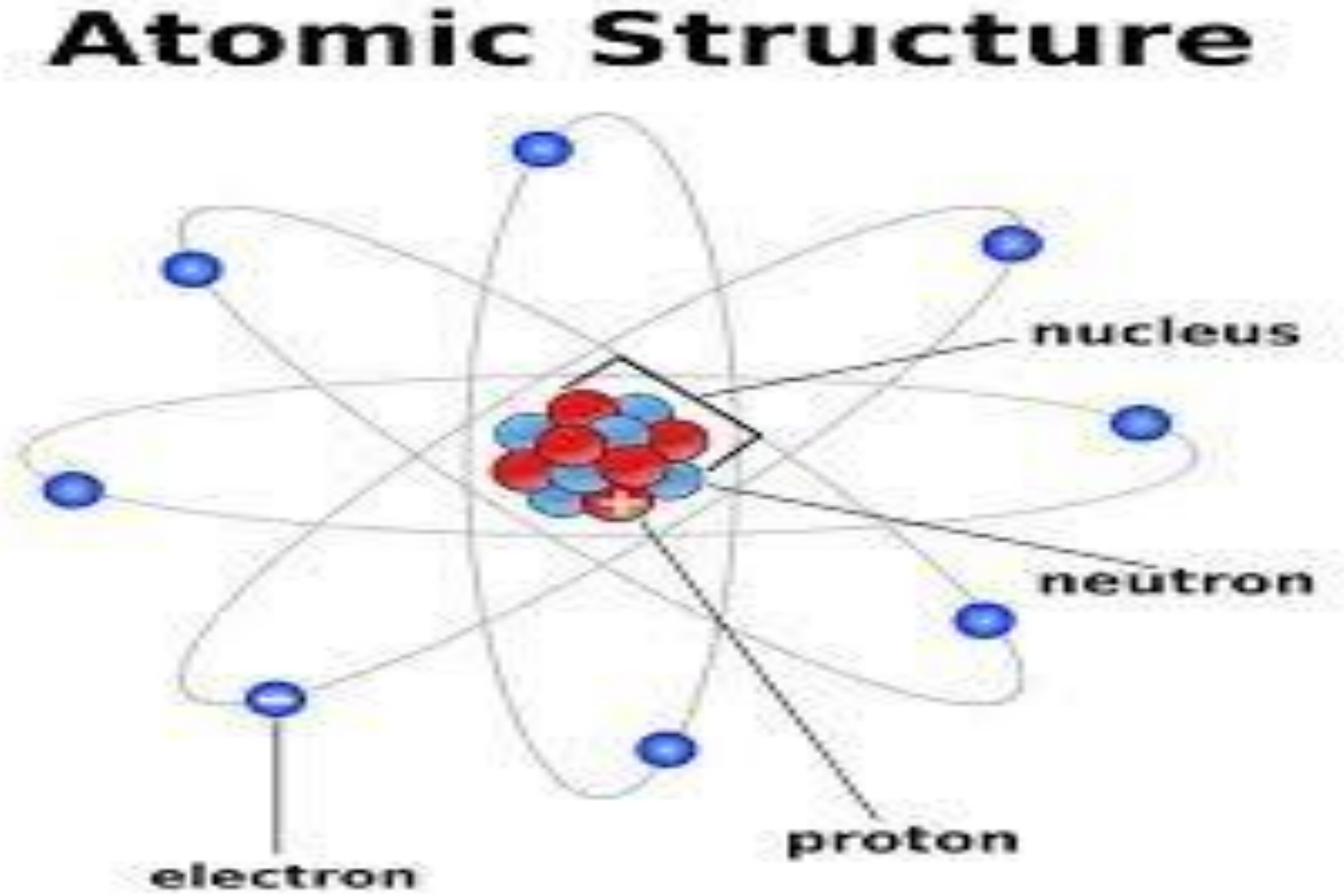
8
O
Oxygen
15.9994
2 6
92
U
Uranium
238.02891
2 8 18 32 21 9 2


Thank
You


TAKE CARE

LECTURE NO:5



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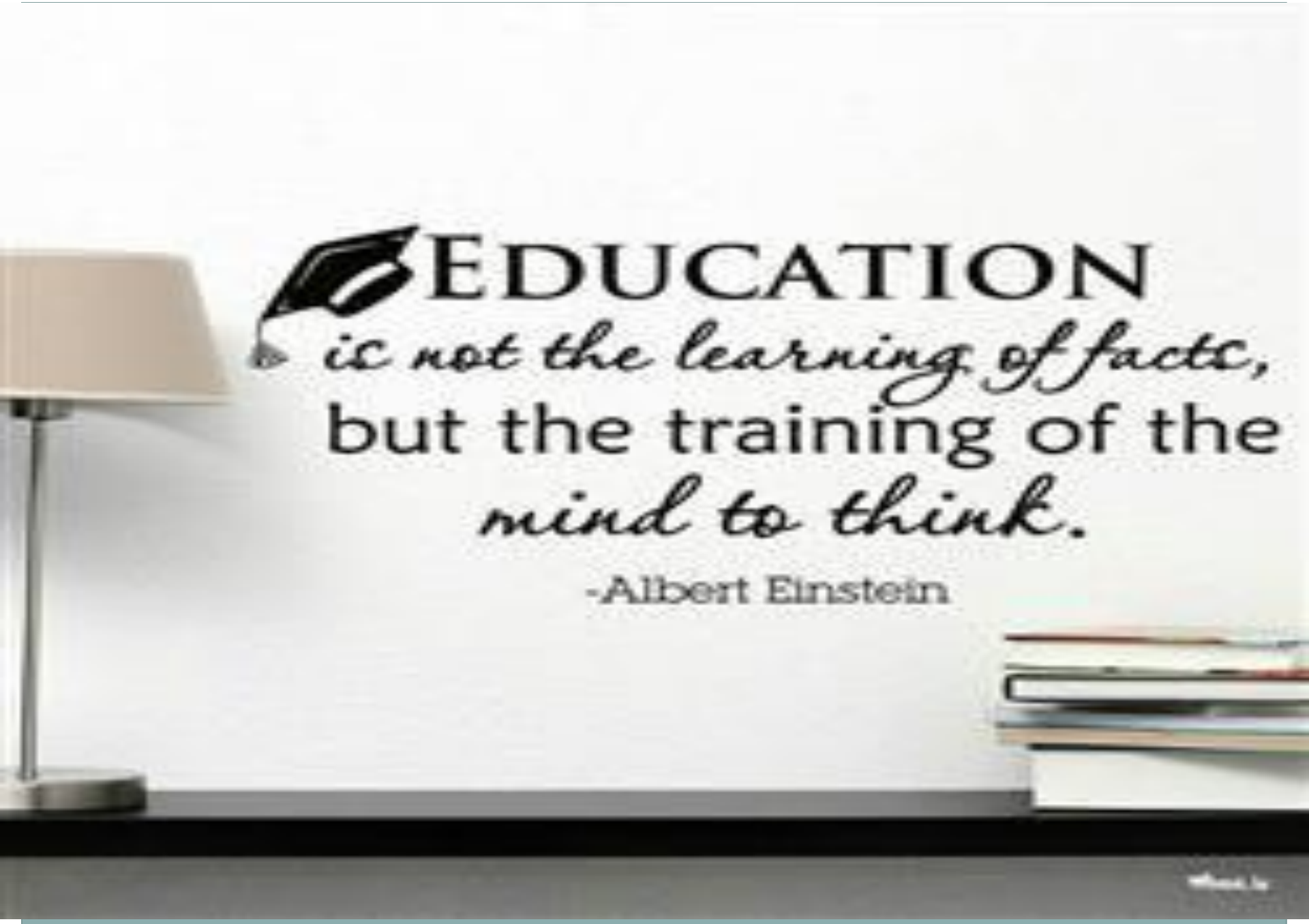
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